

**PRECLINICAL SAFETY EVALUATION OF  
MANDURA CHENTHOORAM**

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**CHENNAI-47.**

### **DECLARATION BY THE CANDITATE**

I hereby declare that dissertation entitled **“Preclinical safety evaluation of MANDURA CHENTHOORAM”** is a bonafide and genuine research work carried out by me under the guidance of **Dr. R. Madhavan, M.D. (s).**, Department of Nanju Noolum Maruthuva Neethi Noolum, National Institute of Siddha, Chennai – 47, and the dissertation has not formed the basis for the award of Degree, Diploma, Fellowship or another similar title.

Date:

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Place: Chennai-47.

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## **BONAFIDE CERTIFICATE**

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# *Introduction*

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## 1. INTRODUCTION

Siddha system is one of the ancient systems of medicine founded by Siddhars who lived a spiritual life in the southern region of India. Siddha system is practiced since ancient days nearly BC 10,000 to BC 4000 ago. The Siddhars were the embodiment of divine knowledge, with which they served the people to cure diseases. This practice has been hereditarily natural by their successors for generations. It is a psychosomatic system of medicine that deals with the relationship between the mind and body and aims at maintaining the physical, mental and moral health of an individual.

“ஆயுள் மாமறை யேமறை யாமெவ்வா றென்னின்

ஆய வீட்டை வோர்கள்மா னிடர்களே யல்லால்

ஏய வேறிலை யவருடல் வீந்திடா தியற்றத்

தூய நன்மருந் துரைத்தலா லாமெனச் சொல்வாய்”.

- தேரையர்<sup>2</sup>

According to the Siddha system, human body is based on three vital humors Vatham, Pitham, Kapham. These humors are formed by Panchabootham. Disease occurs due to derangement of these vital humors<sup>3</sup>.

The Siddha system of medicine is not only used to cure, but also to prevent disease and in turn to increase the life span of human beings. Siddha medicine also shows how to lead a healthy life, by following basic principles and eating healthy diets. In Siddha system of medicine the drug sources are obtained from plant, mineral, metal and animals. Exclusive of Siddha system are Kayakarpam, Attanga yogam, Muppu, Varmam, Envagai thervu, Manikkadai nool, Sarakkuvaippu, 32 types of internal medicine and 32 types of external medicine. The medicinal nature of the food is highly emphasized in this system of medicine, which is stated as,

**“Unave Marunthu Marunthe Unavu”.**

The scientist Paracelsus quoted that, “All substances are poisons there is none which is not a poison”. The right dose differentiates a poison from a remedy. The total discipline of toxicology is a paramount science and influences human life right from

inception and even after death, should exhumation be required. Poison is a substance with an interest property that lends to destroy life or impair health.

In Siddha system of medicine, Manduram (Ferroso ferric oxide) is used as a medicine in treating various diseases, especially blood related conditions. The Siddha literature stated that manduram is highly useful in haematopoietic process.

Nowadays, Anaemia like blood related disorders are more prevalent among ladies and children's. In severe condition, mortality may occur. As manduram induces haemopoietic process, it safeguards many lives of diseased. By keeping all these facts in mind, the author had selected **“Preclinical safety evaluation of MANDURA CHENTHOORAM”** for this dissertation.

The reason for selecting Mandura Chenthooram is that manduram is easily available and also used in numerous formulations. Manduram is one among the 11 ulogams. The metallic preparations are more effective curing diseases than the herbal formulations.

So, the author is very keen in evaluating the Acute and Sub acute toxicity of **Mandura Chenthooram** which is mentioned in Kannusamy Parambarai vaithiyam.

This toxicity study of me is just a small step in the right direction of establishing the safety of siddha drugs. This is dedicated to the glory of the Siddha system.

# *Aim and Objectives*



## **2. AIM AND OBJECTIVES**

### **AIM**

To Preclinical safety evaluation of Mandura Chenthooram.

### **OBJECTIVES**

To analytical evaluation of Mandura Chenthooram.

To study the toxicity profile of Mandura Chenthooram.

### **SECONDARY OBJECTIVES**

- Literature of review
- Preparation Mandura Chenthooram.
- To do the following studies on Mandura Chenthooram.
  - Physicochemical analysis
  - Biochemical analysis
  - Spectroscopic analysis
  - Acute Oral Toxicity study as per OECD guideline-423<sup>43</sup>
  - Repeated dose 28-days Oral Toxicity study as per OECD guideline-407<sup>44</sup>

# *Review of Literature*

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*SIDDHA ASPECT*

## 1. மண்டூரம்

அயத்தைக்காட்டிலும் நிறைந்த வன்மையுடையது.

வேறுபெயர்கள்:

- அயக்கிட்டம்,
- அயச்சிட்டம்,
- அயோமலம்,
- கிட்டம்,
- சிட்டம்,
- சிட்டான்,
- லோகமண்டூரம்.

இதன் சுவை, வீரியம், செய்கை முதலியன அயத்தை ஒத்திருக்கும்.

சுவை — பெரும்பான்மை துவர்ப்பு, சிறுபான்மை புளிப்பு, கைப்பு

வீரியம் - வெப்பம்

செய்கை — குருதிப்பெருக்கி,

பசியுண்டாக்கி

உடல் உரமாக்கி(பலகாரி),

உடல்தேற்றி(வியாதபேதகாரி)

பொதுக்குணம்:

“சிட்டமொன்றாற் சோபை கிளைவீக்க மத்திசுரந்

துட்டவிட பாகஞ் சுவாசமையங் - கெட்டகொடும்

பாண்டிருமல் நீராமை பாழும் பிரமியமுன்

தாண்டிவிடு முண்டிரத்த தாது”.

பொருளுரை:

மண்டூரத்தினால் வாதசோபை முதலிய வீக்கங்கள், அத்திசுரம், கொடிய விடபாகம், இரைப்பு, கபகோபம், தேகம் வெளிறல், காசம், நீராமைக்கட்டி, பிரமியம் இவை நீங்கும். இரத்தம் விருத்தியாகும்<sup>4,1,7</sup>.

### சுத்தி முறைகள்:

அயக்கிட்டத்தை உரலிலிட்டு இடித்து, வஸ்திரகாயம் செய்து ஒரு பீங்கான் பாத்திரத்தில் இட்டு, அதன் மேல் நான்கு அங்குலம் நிற்கும்படியாகக் காரமான சீமைத் திராட்சைக் காடியைவிட்டு, இரண்டு வாரம் ஊறவைத்து, வெள்ளைப்பூண்டை இடித்துப் பிழிந்த சாற்றை முன்போல்விட்டு ஒரு வாரம் ஊறவைக்க வேண்டும். ஊறவைக்கும் போது, மூன்று நாளைக்கொரு முறை ஊறவைத்த சாற்றை இடையிடையே ஊற்றிவிட்டு, அச்சாற்றையே புதிதாய் விட வேண்டும். இவ்விதம் முறையே முன்சாறுகளால் செய்த பின்பு, வாதுமை நெய்யில் அல்லது பசுவின் நெய்யில் சிட்டத்தை நன்றாய் வறுத்துப் பொடித்துக் கொள்வதே கிட்டத்தின் சுத்தி.

### (வேறு)

கிட்டத்தை கல்லுரலிலிட்டு இடித்து, வாயகன்ற ஒரு சட்டியிலிட்டு, அதன்மேல் நான்கு பங்கு எடை புளியிலையைப் போட்டு, எண்மடங்கு நீர் விட்டு, ஒரு சாமம்(3மணி) வேகவைத்து, ஆறியபின் இலையையும் பொடியையும், சேர்த்து நன்றாய்த் தேய்த்துக் கழுவி உலர்த்தி, முறத்திலிட்டுப் புடைத்து, இலையை நீக்கிவிடுக. பிறகு, கிட்டப்பொடியை அம்மியிலிட்டுப் பொடித்து, ஒரு சட்டியிலிட்டு, எட்டுப் பங்கு கோமூத்திரத்தை விட்டு, அடுப்பேற்றிச் சிறு தீயால் எரித்து, மூத்திரம் சுண்டியபின் இறக்கி, நீர் விட்டுக் கழுவி எடுத்துக்கொள்ளச் சுத்தியாம்.

### உலோக மண்டூர்ச் செந்தூரம்

“இரும்பினாஞ் சிட்டை யிலவணைபெண் ணாண்கை

இரும்பினாஞ் சிட்டைகணி யின்பை- இருப்பி

அரைத்துப் புடமிட்டி யாமுலோ கத்தை

அரைத்துப்பு மண்டூர மாம்”.

### பொருளுரை:

இரும்பினால் விடப்பட்டு அக்கினியில் வெந்து மெழுகின் பதத்தில் கட்டியான சிட்டத்தை, பாதி நிறையான பஞ்சலவணமும், கந்தியும், இரசமும், மிளகு, திப்பிலி, சுக்கு, உள்ளி இந்த நான்கும், இவைகளை வெள்ளாட்டு நீரில் ஊறவைத்து அரைத்து, நம்மாலே செய்யப்பட்ட, நன்மையான பணிக்கை, கையாந்தகரைச் சாற்றிலும், துளசிச் சாற்றிலும் கலந்து, மத்தித்து மருந்தை வில்லை தட்டி அவ்வாறே அடிக்கடி புடத்தையும் போட்டெடுப்பாயாக நான்கு நாட்களுக்கொருமுறை இப்படியாகவே இந்த

உலோகத்தைச் செய்தால், அரைவாசி சிவந்த நிறமுள்ள மண்டூர்ச் செந்தூரமாகும்.  
இதனை,

“ஆதி லோகத் தயமெனுஞ்சிட்டத்திற்

பாதி லோகப் பாடலி தோன்றவே

வேதி யாது விவரமதை நாடொறும்

ஓதி யோதி யொழியவொண் ணாதரோ”.

என்னும் மாபுராணச் செய்யுளாலுமறிக.

**அளவு:**

ஒரு குன்றி – உத்தமம்

இரண்டு குன்றி – மத்திமம்

மூன்று குன்றி – அதமம்

நான்கு குன்றி – அதமாதமம்

இச்செந்தூரத்தைப் புசிக்க ஏற்ற நிலம், மாதம், நாட்பிரமாணம் முதலியன  
அயச்செந்தூரத்திற்குக் கூறியவை போன்றனவேயாகும்.

**நிலம்:**

**வாதம்**

முல்லை – உத்தமம்

குறிஞ்சி – மத்திமம்

நெய்தல் - அதமம்

**பித்தம்**

நெய்தல் - உத்தமம்

குறிஞ்சி – மத்திமம்

முல்லை - அதமம்

## கபம்

முல்லை – உத்தமம்

நெய்தல் - மத்திமம்

குறிஞ்சி - அதமம்

வாதம் முதல் மூவகை நோயினர்களுக்கு மருதம் உத்தமத்தில் உத்தமம், பாலை அதமத்தில் அதமம் ஆகும்.

## செந்தூரம்(வேறு)

நாட்சென்ற நான்கு பலம்(140 கிராம்) மண்ரூத்தை இடித்து நான்குபடி(5.2 மி.லி) வெள்ளாட்டு நீரில் ஒரு நாள் ஊறவைத்து நீர்ச்சுண்டக்காய்ச்சி, பிறகு நெருப்பிலிட்டு பழுக்கக்காய்ச்சி, பசுநீரில் பத்துமுறை தோய்த்துக் கழுவி எடுத்து, கல்வத்திலிட்டுச் சோற்றுக் கற்றாழைச் சாற்றால் ஒரு நாளரைத்து, வில்லை தட்டி, உலர்ந்த பின் ஓட்டிலிட்டுச் சீலை மண் செய்து, இரண்டு முழ உயரம் புடம் போடவும், இவ்விதமாகச் சோற்றுக் கற்றாழைச் சாற்றில் பத்துப் புடமும், நீர்முள்ளி, கரிசலாங்கண்ணி, வீழி, வேலிப்பருத்தி, மானுளம் பழம் இவைகளின் சாற்றினால் வகைக்குப் பத்துப் புடமும் போட்டு எடுத்து வைத்துக்கொண்டு, இதில் வேளைக்குப் பணவெடை(488 மி.கிரா) வீதம், கரிசலாங்கண்ணிச் சாற்றில், தினம் காலை மாலை இருவேளையும் கொடுக்க மகோதரம், விஷபாகம், விடநீர்க்கோவை, பாண்டு, சோகை, சூலை, குன்மம், நீர்க்கடுப்பு, தாகம், வாதம், குடல்வாதம், கிரகணி முதலியன தீரும்.

சுத்த மண்ரூம், மகா மண்ரூம், சித்த மண்ரூம், திரிகடுகாதி மண்ரூம், நாராயண மண்ரூம் என மண்ரூம் சேர்த்துச் செய்யப்படும் மருந்து முறைகள் பல உள்ளன.

இவைகளின் பொதுக்குணம்,

“சுத்தமண் ரூந் துதிமகா மண்ரூஞ்

சித்தமண் ரூந் திரிகடுக – மொத்திடுமண்

ரூநா ரயணமண் ரூமிவை கட்குவெகு

தூரமாம் பாண்டொடுசோ பை”.

**பொருளுரை:**

சுத்த மண்டூரம், மகா மண்டூரம், சித்த மண்டூரம், திரிகடுகாதி மண்டூரம், நாராயண மண்டூரம் இவைகளினால் ஐவகைப் பாண்டு நோய்களும் ஆறுவிதச் சோபை நோய்களும் ஒழியும்.

### **மகா மண்டூரம்**

திரிகடுகு, திரிபலை, வாய்விடங்கம், மஞ்சள், சித்திரமூல வேர்ப்பட்டை, இவைகளின் சூரணம் சமவெடை கூட்டி, இதற்குச் சமவெடை மண்டூரம் சேர்த்துக் கரிசாலைச் சாற்றால் அரைத்துக் கொள்ளவும்.

**அளவு:** இலந்தைக் கொட்டை.

**துணை மருந்து:** சர்க்கரை, நெய்.

**தீரும் நோய்:** பாண்டு, சோபை.

### **சித்த மண்டூரம்**

கோ மூத்திரத்தில் சுத்தி செய்த மண்டூரம் பலம் எட்டைப்(280 கிராம்) பொடித்து, நுண்ணிய தூளாக்கி, அறுபத்து நான்கு பலம்(2.240 கி.கிராம்) கோ நீரிலிட்டு அடுப்பேற்றிக் கொதிக்க வைத்துக் குழம்பு பக்குவத்தில் வரும் போது, திரிபலை, திப்பிலிமூலம், திரிகடுகு, செவ்வியம், சிவதைவேர், சாறடைவேர், கடுகுரோகிணி, வாய்விடங்கம், தேவாரம், மஞ்சள், மரமஞ்சள், சித்திரமூலம், குடசப்பாலை வித்து, கோரைக் கிழங்கு, புஷ்கரமூலம்(கோஷ்டம்), நாபி, வாளம் இவைகளின் சூரணம் வகைக்குப் பலம் ஒன்று சேர்த்து, மேற்படி குழம்பில் கூட்டிப் பிசைந்து கொள்ளவும்.

**அளவு:** கழற்சியளவு

**துணை மருந்து:** மோர்

**தீரும் நோய்:** பாண்டு, சோபை.

### **திரிகடுகாதி மண்டூரம்**

திரிகடுகு, திரிபலை, ஏலம், சாதிக்காய், கிராம்பு, காட்டாத்திப்பூ, திப்பிலிமூலம், கோரைக்கிழங்கு, சடாமாஞ்சில், கர்க்கடகசிங்கி இவைகளைச் சூரணம் செய்து, சமபாகங்கூட்டி கூட்டிய எடைக்குச் சரியாக மண்டூரப் பொடி கூட்டி, மண்டூர எடைக்குப்



பாதி லோகப்பொடி கூட்டி கரிசாலைச் சாற்றாலரைத்து, இலந்தைக் கொட்டை அளவு மாத்திரை செய்து கொள்ளவும்.

**அனுபானம்:** சர்க்கரை, தேன்.

**தீரும் நோய்கள்:** பாண்டு, சோபை, காமாலை, சயம், சுரம். பசி உண்டாம்.

### நாராயண மண்டூரம்

திரிகடுகு, திரிபலை, திப்பிலிமூலம், யானைத்திப்பிலி, செவ்வியம், சிறுதேக்கு, ஓமம், குரோசாணி ஓமம், வசம்பு, மஞ்சள், கடுகுரோகிணி, வெள்ளுள்ளி, பெருங்காயம், மயிலிறகுச்சாம்பல், வாளம், பிரண்டை, காட்டாத்திப்பூ, நிலவேம்பு, சாதிக்காய், தண்ணீர்விட்டான், முட்காவேளைவேர், சாறடைவேர், கரிசாலை, ஆலவிழுது, தும்மட்டிக்காய் இவைகளைச் சமபாகமெடுத்துச் சேர்த்து, சேர்ந்த எடைக்குச் சமன் மண்டூரங் கூட்டி, ஆடாதோடைச்சாறு, கரிசாலைச்சாறு, எலுமிச்சம் பழச்சாறு, இஞ்சிச்சாறு, ஆயில்பட்டைக் குடிநீர், தெளிந்த காடி, நெல்லிக்காய்ச் சாறு இவைகளில் முறையே அரைத்துக் கொள்க.

**அளவு:** புளியங்கொட்டை, காலை, மாலை

**துணை மருந்து:** வெந்நீர், மோர்.

**தீரும் நோய்கள்:** பாண்டு, சோபை, காமாலை, அக்கினிமந்தம், குன்மம், சூலை, பாரிச சூலை, பீநிசம், சுவாசகாசம், அருசி முதலியவை.

### மண்டூர்ச்செந்தூரம்

**சரக்கும் செய்பாகமும்:**

ஐந்து பலம் நாட்சென்ற மண்டூரத்தைக் கொண்டுவந்து கன்னான் உலையில் வைத்துப் பழுக்க ஊதிக் கோவின் நீரில் தோய்க்கவும். இப்படி ஐந்து முறைக் காய்ச்சிக் காய்ச்சிக் தோய்க்கச் சுத்தியாகும். இதை, ஈரமில்லாமல் துடைத்துக் கல்லுரலில் போட்டுக் கடப்பாறைகொண்டு மாவுபோல் இடித்துக் கல்வத்தில் போட்டுக் கரிசாலைச்சாற்றில் ஒரு நாளும், குமரிச்சாற்றில் ஒரு நாளும் நன்றாயரைத்து மெழுகுபதத்தில் வில்லை தட்டி ரவியில் உலர்த்தி அகலில் வைத்து மேல் அகல் மூடிச் சீலை செய்து 50 வறட்டியில் புடமிடவும். இப்படியே கரிசாலைச்சாற்றில் அரைத்து அரைத்து முன்போல் வில்லை தட்டி அகலில் வைத்து மேல் அகல் மூடிச் சீலை செய்து 10-15 புடம் வரையில் போட்டுவர உயர்தரமான செந்தூரமாகும்.

**அளவு:** ஒரு குன்றி

**நாளளவு:** இருவேளை, 1/2-1 மண்டலம்.

**தீரும் நோய்கள்:** எரிகுன்மம், சத்திகுன்மம், பித்தகுன்மம், சுரப்பாண்டு, பித்தபாண்டு, வாதரோகம், பித்தரோகம், சிலேத்துமரோகம், காமாலை, பாண்டு. தாதுபுஷ்டி உண்டாகும்<sup>1</sup>.

### கருங்குழம்பு

“கட்டாக வின்னங் கழறுகிறேன் வல்லத்துக்

கிட்டமொடு காந்தங் கிருபையாய் - நட்டமில்லை

நீர்வடியின் முத்து நிறையாய்க் கழஞ்சொன்று

நேர்வாளம் இரண்டாகு நேர்”.

“நேர்ந்தித்த நாற்சரக்கை நேரிழையே சுத்திசெய்து

போர்நிறைந்த கல்வத்திற் போட்டரைப்பாய் - சீராக

மேதிச் சிமிள்வைத்து வேண்டிப் பணவெடைதான்

பாதிபனை வெல்லத்திற் பாய்ச்சு”

“வெல்லமதி லுண்டுபார் மெல்லியர்கள் சூதகமும்

அல்லூருங் கட்டிநீ ராம்பலெங்கே – சொல்லக்கேள்

காணு மகோதரமுங் காமாலை காய்ச்சற்கட்டி

பூனுபல வாயுவும் போம்”.

**பொருளுரை:**

வல்லத்துச் சிட்டம், காந்தம், தோல் நீக்கிய நீரடிமுத்து இவை வகைக்கு ஒரு கழஞ்சும்(5.1கிராம்) நேர்வாளம் இரு கழஞ்சும்(10.2கிராம்) சுத்தி செய்து, கல்வத்திலிட்டு மெழுகு பதமாக அரைத்து, எருமைக் கொம்புச் சிமிழில் வைத்துக்கொள்ளவும்.

**அளவு:** அரைப் பணவெடை(244மி.கிராம்)

**துணை மருந்து:** பனைவெல்லத்திற்குள் வைத்து அருந்துக.

**தீரும் நோய்கள்:** சூதக வாய்வு, இரத்த வாத குன்மக்கட்டி, நீரம்பல், மகோதரம், காமாலை, காய்ச்சற்கட்டி, வாதநோய்கள்.

### **மண்டுர மாத்திரை**

கிட்டம், காந்தம், இந்துப்பு, கருஞ்சீரகம், திரிகடுகு, இவை வகை ஒன்றுக்கு ஒரு பலம் இவற்றைக் கல்வத்திலிட்டுக் கையாந்தகரைச்சாற்றால் மூன்று நாள் 12 சாமம் அரைத்துக் காசளவு வில்லைகள் செய்துவைத்துக் கொள்ளவும்.

**நாள் அளவு:** ஏழு நாள், காலை, மாலை.

**துணை மருந்து:** தேன்.

**தீரும் நோய்கள்:** பித்தப்பாண்டு, விஷப்பாண்டு.

**பத்தியம்:** உப்பு<sup>4</sup>.

**மண்டுரம் சேரும் மருந்துகள்:**

1. திரிமூர்த்தி செந்தூரம்:

**அளவு:** 1-1½ குன்றி (130-195mg)

**துணை மருந்து:** நெய், தேன்.

**தீரும் நோய்கள்:** பாண்டு, சோகை, காமாலை<sup>5</sup>.

2. சுத்த மண்டுரச் செந்தூரம்

**அளவு:** 1-1½ குன்றி (130-195mg)

**துணை மருந்து:** நெய், தேன்.

**தீரும் நோய்கள்:** பாண்டு, சுவாசகாசம்<sup>5</sup>.

3. மஹா மண்டுரச்செந்தூரம்

**அளவு:** 1-1½ குன்றி.(130-195mg)

**தீரும் நோய்கள்:** வீக்கரோகங்கள்<sup>5</sup>.

4. மண்டுர மாத்திரை:

**அளவு:** குன்றிப் பிரமாணம், காலை,மாலை

தீரும் நோய்கள்: மண்ணீரல் வீக்கம், காமாலை, பாண்டு, ஊருஸ்தம்ப வாதம், மூலரோகம், சுரம்<sup>5</sup>.

**5. இரும்பு சிட்டகற்பம்:**

அளவு: 10 – 20 குன்றி

தீரும் நோய்: ஊதல் நோய்.<sup>6</sup>

**6. மண்டுரச் செந்தூரம்:**

அளவு: 1 குன்றி

அனுபானம்: கரிசலாங்கண்ணிச்சாறு

தீரும் நோய்: மகோதரம், விஷநீர்க்கோவை, பாண்டு, சோபை, குன்மம், கிராணி<sup>7</sup>.

## 2. பசுநீர்

வேறுபெயர்:

- நீர்,
- அமுரி,
- மூத்திரம்,

“..... நீர் சிறு நீர்முரி

மூத்திரமென் றேபெயரோர் மூன்று” என்ற அடிகளால் உணர்க.

பசு மூத்திரக் குணம்:

“விடபாண்டு சோபைபல வீக்கஞ் சகல

விடமுதிர மாலையென மெத்தப் - புடவிதனிற்

பேசலக்க ணோடுதந்தப் பீடை யகன்றிடுமே

கோசலத்தா லாரணங்கே கூறு.”

பொருளுரை:

கோசலத்தால் விஷப்பாண்டு, சோபை, பற்பல வீக்கம், சகல விஷம், அசிர்க்கு, காமாலை, பல்நோய் முதலிய பிணிகள் போம்.

செய்கை:

சிறுநீர்ப் பெருக்கி

மலமிளக்கி.

பசுவின் நீர் உள்ளுக்கும் வெளிக்கும் பயன்படுத்தப்படுகிறது.

பசுநீரின் உபயோகம்:

- ❖ பசுவின் நீரை வடிகட்டி, ஒன்று முதல் இரண்டு அவுன்ஸ் வரை கொடுத்துவர, அகுவை, மகோதரம், நீர்க்கட்டு, மலக்கட்டு, பெருநோய், தோல் சம்பந்தப்பட்ட பிணிகள் தீரும்.
- ❖ எட்டு அவுன்ஸ் பசுவின் நீரில், ஒரு கடுக்காய்த் தோலிட்டு ஊறவைத்து கலந்து வடிகட்டி, ஓர் அவுன்ஸ் நீரைக் கொடுக்க, அகுவை, மகோதரத்தில் உண்டாம் மலசலக்கட்டு இவற்றை நீக்கிக் குணம் தரும்.

- ❖ இருவி, நாபி இவை போன்றவைகளைத் தனித்தனிப் பசுவின் மூத்திரத்தில் மூன்று நாள் ஊறவைத்தெடுக்கச் சுத்தியாம்.
- ❖ அயம், உருக்கு, மண்டுரம் இவைகளைத் தனித்தனியாகக் கொல்லன் உலையிலிட்டுக் காய்ச்சி பன்முறை பசுவின் நீரில் தோய்த்தெடுக்கச் சுத்தியாகும்<sup>8</sup>.

### 3. வெற்றிலை

வேறு பெயர்:-

- தாம்பூலம்,
- தாம்பூலவல்லி,
- திரையல்,
- நாகவல்லி,
- மெல்லிலை,
- வெள்ளிலை,
- மெல்லடகு

- இது இந்தியாவில் வெப்ப பாகத்திலும், சதுப்புள்ள இடங்களிலும் பயிர் செய்யப்படும் மரமேறுங் கொடி. இது இலையின் பொருட்டே பயிரிடப்படுகிறது.
- இது இலையின் நிறத்தாலும், மணத்தாலும், கார்ப்புச் சுவையாலும் மூவகைப்படும். மிகுந்த மணமும், காரமும், கருப்பு நிறமும் இல்லாதது “வெற்றிலை”, கருமையும் காரமும் மிகுந்தது “கம்மாறு வெற்றிலை”, கருப்பூர மணமும், சிறுகாரமுமுடையது “கருப்பூர வெற்றிலை”.

பயன்படும் உறுப்பு: இலை

சுவை – விறுவிறுப்பு,கார்ப்பு

தன்மை – வெப்பம்,

பிரிவு – கார்ப்பு

செய்கை:

வெப்பமுண்டாக்கி

அகட்டுவாய்வகற்றி

துவர்ப்பி

காமம்பெருக்கி

அழுகலகற்றி

வெப்பகற்றி

பசித்தீத்தாண்டி

பாற்பெருக்கி

உமிழ்நீர்ப்பெருக்கி

பொதுகுணம்:

“எட்டிலொன்று கிட்டினீ ரேற்றஞ் சிரோபார

மாட்டி விடுசன்னி மாந்தமொடு – நாட்டிற்

பரியகுரற் கம்மவல்லி பண்டியுப்பி சம்போ

மரியகம் மாறுவெற்றி லை. (அ.கு)

கம்மாறு வெற்றிலையால் நீரேற்றம், தலைபாரம், முப்பிணி, மாந்தம், குரற்கம்மல், வயிற்றுவலி, வயிற்றுப்பிசம் போம்<sup>9</sup>.

சேரும் மருந்துகள்

1. இரசக்கற்பூர மெழுகு:

அளவு: 4 - 7 குன்றி எடை

அனுபானம்: பனை வெல்லம்

தீரும் நோய்: சூலை நோய், புண்கள், வெட்டை<sup>10</sup>.

2. விஷத்திற்கு அஜமுத்ராதி மருந்து:

அளவு: 1 குன்றி எடை

அனுபானம்: வெற்றிலை

தீரும் நோய்: விஷங்கள்<sup>11</sup>.

3. கிரந்தி உருண்டை:

அளவு: 2-3 மாத்திரை

துணை மருந்து: வெல்லம், பனைவெல்லம், வாழைப்பழம்

தீரும் நோய்: கிரந்தி, அரையாப்பு, கண்டமாலை, அரிகிரந்தி, பிளவை, மேகம்<sup>12</sup>.



#### 4. வேப்பிலை கருக்குக்கியாழம்

அளவு: வீசம்படி, இருவேளை

தீரும் நோய்: வாந்தி, ஓக்காளம்<sup>13</sup>.

#### 5. அயவீர்ச்செந்தூரம்

அளவு: 1/4-1/2 குன்றி, இருவேளை

அனுபானம்: தேன், பனவெட்டு

தீரும் நோய்: பரிசுவாதம், முகவாதம், ஜன்னி, சுரம், குடைச்சல், மேகவாயுவினால் உண்டான பிடிப்பு<sup>13</sup>.

#### 6. பஞ்ச பாஷாண செந்தூரம்

அளவு: அரிசியெடை, இருவேளை 5-7 நாட்கள்

தீரும் நோய்: குலை, ஜன்னி, மேகம், வெண்குட்டம், சுரம், வாதம்<sup>80</sup>, கராணி, குன்மம், பிளவை, கண்டமாலை, அண்டவாதம், பவுத்திரம், சுவாசகாசம், கிரந்தி, புத்து, குட்டம், அரிகரப்பான், சொரிகரப்பான், கஜசர்மரோகம், புழுவெட்டு<sup>13</sup>.

வழக்கு:

- ❖ தொண்டையடைப்பு, குரல்கம்மலில் வெற்றிலையையும் சாம்பிராணிப் பதங்கத்தையும் மென்று சுவைக்கும்படி செய்யலாம்.
- ❖ பாற்சுரக்கவும், பால் கட்டி உண்டாகும் முலை வீக்கத்தைக் கரைக்கவும் வெற்றிலையைத் தண்ணிலில் வாட்டி அடுக்கடுக்காக வைத்துக்கட்டவும்.
- ❖ வெற்றிலையை எண்ணெயில் நனைத்து, விளக்கில்வாட்டி மார்பின் மேல் போட இருமல், மூச்சுமுட்டல், கடினசுவாசம், குழந்தைகளுக்குண்டாகும் இருமல் விலகும். இவைகட்கே வெற்றிலைச் சாற்றுடன் சுண்ணாம்புக் கூட்டி தொண்டைக் குழியில் தடவலாம்.
- ❖ வெற்றிலைச் சாற்றுடன் இஞ்சிச்சாறும் சேர்த்து, நுரையீரல் சம்பந்தமான நோயில் வழங்கலாம்.
- ❖ தலைப்பளுவுக்கு முக்கிலும், காது குத்தலுக்கு அக்காதிலும் வெற்றிலைச் சாற்றில் 2 – 3 துளி விடலாம்.
- ❖ தீப்பட்ட புண்ணின்மீது வெற்றிலையை வைத்துக் கட்டலாம்.
- ❖ பாதரசம், வெற்றிலைச் சாற்றால் தூய்மையாம்.
- ❖ 2-3 வெற்றிலையுடன் 4-5 மிளகு சேர்த்துக் குடிநீரிட்டுப் புகட்ட சிறுவர்களுக்குண்டாகும் செரியாமை விலகும்.
- ❖ வெற்றிலைச் சாற்றில் கொஞ்சம் கோரோசனஞ் சேர்த்துப் புகட்ட கோழைக்கட்டு, இருமல் மூச்சுத் திணறல் குணமாகும்.

- ❖ சிறுபிள்ளைகளுக்குண்டாகும் வயிற்றுப் பொருமல், மலக்கட்டு இவைகளைப் போக்க, வெற்றிலைக் காம்பை ஆமணக்கு நெய்யில் நனைத்து, கீழ்வாயில் வைக்கலாம்.
- ❖ காமப்பெருக்கை உண்டாக்கும் பொருட்களுடன் சேர்த்துண்ண கலவியில் இச்சை உண்டாகும்<sup>9</sup>.
- ❖ அய பற்பம், செம்பு பற்பம், தங்க பற்பம் மருந்துகளுக்கு அனுபானமாக பயன்படுகிறது.
- ❖ பூரத்தினை சுத்தி செய்ய கம்மாறு வெற்றிலை உதவுகிறது<sup>4</sup>.

#### 4. நொச்சி

வேறு பெயர்:

- இந்திரசூரியம்,
- நித்தில்,
- நிர்க்குண்டி,
- நெர்க்குண்டி,
- சிந்தும சிந்துவாரம்.

- இது இந்தியா முழுவதும் வளருகின்ற ஒரு சிறியமரம்.
- இதில் கருநொச்சி, நீர்நொச்சி, வெண்ணொச்சி எனப் பிரிவுகள் உள்ளது. வெண்ணொச்சி எங்கும் கிடைக்கக்கூடியது. கருநொச்சி கிடைப்பது அரிது. நீர்நொச்சி தாமிரவருணி ஆற்றங்கரையிலுண்டு.

பயன்படும் உறுப்பு: இலை,பூ,வேர்,பட்டை

சுவை – கைப்பு, துவர்ப்பு,கார்ப்பு

தன்மை – வெப்பம்

பிரிவு – கார்ப்பு

செய்கை:

பொது

உடல்தேற்றி

புழுவகற்றி

வேர்

வெப்பகற்றி

கோழையகற்றி

சிறுநீர்ப்பெருக்கி

பூ

துவர்ப்பி<sup>9</sup>

நொச்சி சேரும் மருந்துகள்:

1. சன்னிவாதசுரக் குடிநீர்:

அளவு: 30-60 மி.லி.<sup>14</sup>.

2. நிர்குண்டித்தைலம்:

அளவு: துட்டிடையளவு

தீரும் நோய்கள்: 5வகை காசரோகங்கள், ஷயரோகங்கள்<sup>15</sup>.

3. குழந்தைகள் மாந்த கியாழம்:

அளவு: 1 சங்கு அளவு, 3-4 வேளை

தீரும் நோய்: மாந்தம் நீங்கும்<sup>16</sup>.

4. சோதிரிசித்தைலம்:

அளவு: 1 காக எடை

தீரும் நோய்: சகல வலிப்புகளும் நீங்கும்<sup>17</sup>.

5. செங்கத்தாரி எண்ணெய்:

அளவு: 1 தேக்கரண்டி

தீரும்நோய்:

- ✓ புடை,
- ✓ கொள்ளி,
- ✓ வீங்கு,
- ✓ பித்தவாதம்,
- ✓ செங்கரப்பான்,
- ✓ அரிகரப்பான்,
- ✓ கருங்கரப்பான்<sup>17</sup>.

## 5. வெள்ளாட்டுப்பால்

வேறுபெயர்:

- பயம்,
- கீரம்,
- சுதை,
- பயசு,
- பாகு,
- அமுது,
- துத்தம்,
- சாறு.

இதற்கு ஒப்பான ஒருவிதப்பாலும் இல்லை<sup>19</sup>.

வெள்ளாட்டுப்பால் குணம்:

“வெள்ளாட்டு பாலுக்குமேவியநற் றீபனமாந்

தள்ளாடு வாதபித்தஞ் சாந்தமாம் - உள்ளிரைப்புச்

சீதமதி சாரஞ் சிலேஷ்மமறும் புண்ணாறும்

வாத சிலேஷ்மமுப்போ மாய்ந்து.”

பொருளுரை:

வெள்ளாட்டுப் பாலினால் வாதபித்த தொந்தம், சுவாசகாசம், சீதாதிசாரம், கபதோஷம், விரணம், வாதத்திலுண்டாகிய வீக்கம், முதலிய துன்பந் தீரும். நல்ல பசியும் உண்டாகும்.

வெள்ளாட்டுப்பால்:

- ❖ ஊன் செய் பொருளும், கொழுப்புப் பொருளும் குறைவுபட்ட வெள்ளாட்டுப்பால் இனிப்பிலும் குறைவுபட்டிருக்கிறது. இது விரைவில் செரிக்கக்கூடியது. மருந்துண்ணும் நோயாளிக்கு இப்பால் சிறந்த பத்தியப் பொருளாகும்.
- ❖ நீர் மிக்க சூட்டினால் மஞ்சள் நிறப்பட்டுக் குறைந்த பொழுது இப்பாலை உண்டுவந்தால் அது விரைவில் குணமாகும்.
- ❖ வெள்ளாட்டுப்பாலுடன் நீர் சேர்த்துக் காய்ச்சிக் கற்கண்டுத் தூள் சேர்த்து, காலை மாலைகளில் அருந்தி வர கபநோய்கள் நீங்கும்.

- ❖ பாண்டு, சோபை, காமாலை ஆகிய நோய்களுக்கு அயம், அயகாந்தம் இவைகளாலாகிய செந்துரங்களை வழங்கும்பொழுது, காய்ச்சிய வெள்ளாட்டுப் பாலைச் சோற்றுடன் கூட்டிப் பத்தியமாக உண்டுவரின் விரைவில் நோய்கள் நீங்கும்.
- ❖ கணை, கல்லீரல், மண்ணீரல் முதலிய நோய்களினால் வருந்தும் குழந்தைகளுக்கு வெள்ளாட்டுப்பாலை உணவாக வழங்கிவர அவை குணமடையும்.
- ❖ இளைப்பு நோயினால் வருந்துகின்றவர்கள், பலவகைத் தாவரங்களை உண்ணும் இயல்புடைய வெள்ளாட்டுப் பாலை உண்டுவர பயனைத் தரும்.
- ❖ கர்ப்பம் தரித்தவர்களுக்கும், ஈரல் பஞ்சை பட்டவர்களுக்கும், காக்கை வலிக்கும் பயன்படாது<sup>19</sup>.

**வெள்ளாட்டுப்பால் சேரும் மருந்துகள்:**

- ✓ மிளகுத்தைலம்,
- ✓ வாதகேசரித்தைலம்,
- ✓ அமிர்தாமலகத்தைலம்,
- ✓ நிர்க்குண்டித் தைலம்,
- ✓ மூலயோக நிர்க்குண்டித் தைலம்,
- ✓ உளுந்துத் தைலம்,
- ✓ லகுவிடமுட்டித்தைலம்<sup>18</sup>.

## 6. வெள்ளாட்டு நீர்

வெள்ளாட்டு மூத்திரக் குணம்:

“சோபையொடு பாண்டுவைத்து ரத்தும் பலவீக்க

தூபமகற் றும்முதிரத் தைப்போக்கும் - கோபமுடன்

உள்ளாட்டுத் துர்ச்சதையோ டோங்குதர நோயகற்றும்

வெள்ளாட்டு மூத்திரம்வி ரைந்து.”

பொருளுரை:

வெள்ளாட்டு மூத்திரம் சோபை, பாண்டு, பற்பல வீக்கத்தினெரிச்சல், இரத்தப்போக்கு, துர்மாமிசம், மகோதரம் இவைகளை நீக்கும்.

செய்கை:

சிறுநீர்ப் பெருக்கி

மலமிளக்கி

வெள்ளாட்டு நீரின் உபயோகம்:

- வெள்ளாட்டு மூத்திரத்தை வெதுப்பி வடிகட்டி வேளைக்கு ஒன்று முதல் ஒன்றரை அவுன்ஸ் வீதம் சடாமாஞ்சில் அல்லது தசமூலக் குடிநீருடன் கொடுக்கக் காக்கைவலி குணமாம்<sup>20</sup>.

## 7. கற்றாழை

வேறு பெயர்:

- கன்னி,
- குமரி.
- இது இந்தியா முற்றிலும் ஆற்றங்கரைகளிலும், சதுப்பு நிலங்களிலும், தோட்டங்களிலும் பயிராகும்.
- இது சிறுகற்றாழை, பெருங்கற்றாழை, பேய்க்கற்றாழை, கருங்கற்றாழை, செங்கற்றாழை எனப் பலவகைப்படினும், இதன் செய்கை முதலியன சற்றேறக்குறைய ஒத்தேயிருக்கும்.

பயன்படும் உறுப்பு: பால்,மடற்சோறு,சாறு,வேர்.

சுவை – சிறுகைப்பு,

தன்மை – தட்பம்

பிரிவு - இனிப்பு

செய்கை:

உரமாக்கி

உடற்றேற்றி

நீர்மலம்போக்கி

ருதுஉண்டாக்கி

பொதுகுணம்:

“பொல்லாமே கங்கபம்பு முச்சூலை குட்டரசம்

அல்லார்மத் தம்பகந்த ரங்குன்மம் எல்லாம்விட்

டேகு மரிக்கு மெரிச்சற் கிரிச்சரமு

மாகு மரிக்கு மருண்டு”. (தே.கு)

கற்றாழையினால் வாதமேகம், கருமேகம், கிருமிக்குத்தல், பெரு வியாதி, மூலம், உன்மாதம், பகந்தரம், குன்மம், பித்தக்கிரிச்சரம் போம்<sup>9</sup>.



**கற்றாழை சேரும் மருந்துகள்:**

**1. குமரி லேகியம்:**

**அளவு:** ½ தோலா, இருவேளை.

**தீரும் நோய்கள்:** மேக சம்பந்தமான உஷ்ணம், கண்ச்கூடு, பெண்களுக்கு உபயோகப்படுத்த கருப்பாசயம் பலப்பட்டு மாதவிடாயிலுண்டான பலப்பல பிணிகள் நீங்கிச் சந்தானபாக்கியம் உண்டாகும்<sup>5</sup>.

**2. முலைப்பாலெண்ணெய்:**

**அளவு:** பெரியோர் - காலணா எடை, ஒருவேளை.

குழந்தைகள் - ½ முதல் 1 காசெடை.

**தீரும் நோய்கள்:**

பெரியோர் - எலும்புருக்கி, கிராணி, அதிசாரம், சீதக்கடுப்பு, கண்ச்கூடு, மூலச்ச்கூடு, நாட்பட்ட வெள்ளை.

குழந்தைகள் - உஷ்ண ரோகங்கள் நிவர்த்தியாகித் தேகபுஷ்டி உண்டாகும்<sup>5</sup>.

**3. கர்ப்ப விருத்தி எண்ணெய்:**

**அளவு:** 2-3 தோலா, காலை.

**தீரும் நோய்கள்:** மலஜலபந்தம், கைகாலசதி, வாயு உபத்திரவம், மேகத்தினால் சிசு சிதைதல் முதலிய குற்றங்கள் நீங்கிப் பூர்ணசந்திரன் போன்ற நல்ல அழகுடைய குழந்தை பிணியொன்றுமின்றிப் பிறக்கும்<sup>5</sup>.

*MODERN ASPECT*

# 1. MANDURAM

## (Ferroso ferric oxide – Iron oxide)

Ferroso ferric oxide is also known as iron rust, impure of iron or 'Loga Manduram'. It is more potent than iron. This substance is obtained by melting the iron in a furnace and collecting it in waxy consistency. Its taste, potency and action are similar to that of iron<sup>21</sup>.

### IUPAC name

Iron (II) iron (III) oxide

### Other names:

- Eng: Ferrous ferric oxide, Ferroso ferric oxide, Iron (II, III) oxide, Magnetite, Black iron oxide, Lodestone, Rust, Iron (II) diiron (III) oxide
- Sanskrit: Manduram
- Arab: Khabsul Hadid
- Pers: Zang-e-ahana
- Bom: Lohaka janga
- Hindi: Lohaka-Zang
- Ben: Lohar-gu
- Duk: Lohaka-gu; Mandur
- Guj: Lodhano-kata
- Tel: Innupa chittumu
- Mal: Irambak kitane
- Can: Kabbinada Kilubu or kitta
- Sinh: Yakada kittam
- Kon: Lokhanda-gu
- Burm: Sanpia; Tambia<sup>22</sup>

### Properties:

- ✚ Chemical formula- $\text{Fe}_3\text{O}_4$ ,  $\text{FeO} \cdot \text{Fe}_2\text{O}_3$
- ✚ Appearance-solid black powder
- ✚ Solubility-Insoluble in water and organic solvents; soluble in concentrated mineral acids

Except where otherwise noted, data are given for materials in their standard state (at 25 °C [77 °F], 100 kPa).

Iron (II, III) oxide is the chemical compound with formula  $\text{Fe}_3\text{O}_4$ . It occurs in nature as the mineral magnetite. It is one of a number of iron oxides, the others being iron(II) oxide ( $\text{FeO}$ ), which is rare, and iron(III) oxide ( $\text{Fe}_2\text{O}_3$ ) also known as hematite. It contains both  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  ions and is sometimes formulated as  $\text{FeO} \cdot \text{Fe}_2\text{O}_3$ . This iron oxide is encountered in the laboratory as a black powder. It exhibits permanent magnetism and is ferrimagnetic, but is sometimes incorrectly described as ferromagnetic. Its most extensive use is as a black pigment which is synthesised rather than being extracted from the naturally occurring mineral as the particle size and shape can be varied by the method of production.

### **Preparation:**

Under anaerobic conditions, ferrous hydroxide ( $\text{Fe}(\text{OH})_2$ ) can be oxidized by water to form magnetite and molecular hydrogen. This process is described by the Schikorr reaction:



The well-crystallized magnetite ( $\text{Fe}_3\text{O}_4$ ) is thermodynamically more stable than the ferrous hydroxide ( $\text{Fe}(\text{OH})_2$ ).

Magnetite can be prepared in the laboratory as a ferrofluid in the Massart method by mixing iron (II) chloride and iron (III) chloride in the presence of sodium hydroxide. Magnetite can also be prepared

By the chemical co-precipitation in presence of ammonia, which consist in a mixture of a solution 0.1 M of  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$  and  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$  with mechanic agitation of about 2000 rpm. The molar ratio of  $\text{FeCl}_3$ : $\text{FeCl}_2$  can be 2:1; heating this solution at 70 °C, and immediately the speed is elevated to 7500 rpm and adding quickly a solution of  $\text{NH}_4\text{OH}$  (10 volume %), immediately a dark precipitate will be formed, which consists of nanoparticles of magnetite. In both cases, the precipitation reaction rely on a quick transformation of acidic hydrolyzed iron ions into the spinel iron oxide structure, by hydrolysis at elevated pH values (above ca. 10).

Considerable efforts have been devoted towards controlling the particle formation process of magnetite nanoparticles due to the challenging and complex chemistry reactions involved in the phase transformations prior to the formation of the magnetite spinel structure. Magnetite particles are of interests in bioscience applications such as in magnetic resonance imaging (MRI) since iron oxide magnetite nanoparticles represent a non-toxic alternative to currently employed gadolinium-based contrast agents. However, due to lack of control over the specific transformations involved in the formation of the particles, truly superparamagnetic particles have not yet been prepared from magnetite, i.e. magnetite nanoparticles that completely lose their permanent magnetic characteristic in the absence of an external magnetic field (which by definition show a coercivity of 0 A/m). The smallest values currently reported for nanosized magnetite particles is  $H_c = 8.5 \text{ A m}^{-1}$ , whereas the largest reported magnetization value is  $87 \text{ Am}^2 \text{ kg}^{-1}$  for synthetic magnetite.

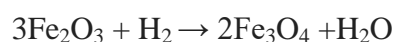
Pigment quality  $\text{Fe}_3\text{O}_4$ , so called synthetic magnetite, can be prepared using processes that use industrial wastes, scrap iron or solutions containing iron salts (e.g. those produced as by-products in industrial processes such as the acid vat treatment (pickling) of steel):

- Oxidation of Fe metal in the Laux process where nitrobenzene is treated with iron metal using  $\text{FeCl}_2$  as a catalyst to produce aniline:

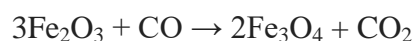


- Oxidation of FeII compounds, e.g. the precipitation of iron (II) salts as hydroxides followed by oxidation by aeration where careful control of the pH determines the oxide produced.

Reduction of  $\text{Fe}_2\text{O}_3$  with hydrogen:



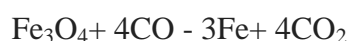
Reduction of  $\text{Fe}_2\text{O}_3$  with CO:



Production of nano-particles can be performed chemically by taking for example mixtures of Fe<sup>II</sup> and Fe<sup>III</sup> salts and mixing them with alkali to precipitate colloidal Fe<sub>3</sub>O<sub>4</sub>. The reaction conditions are critical to the process and determine the particle size.

### **Reactions:**

Reduction of magnetite ore by CO in a blast furnace is used to produce iron as part of steel production process:



### **Structure**

Fe<sub>3</sub>O<sub>4</sub> has a cubic inverse spinel group structure which consists of a cubic close packed array of oxide ions where all of the Fe<sup>2+</sup> ions occupy half of the octahedral sites and the Fe<sup>3+</sup> are split evenly across the remaining octahedral sites and the tetrahedral sites.

Both FeO and γ-Fe<sub>2</sub>O<sub>3</sub> have a similar cubic close packed array of oxide ions and this accounts for the ready interchangeability between the three compounds on oxidation and reduction as these reactions entail a relatively small change to the overall structure. Fe<sub>3</sub>O<sub>4</sub> samples can be non-stoichiometric.

The ferrimagnetism of Fe<sub>3</sub>O<sub>4</sub> arises because the electron spins of the Fe<sup>II</sup> and Fe<sup>III</sup> ions in the octahedral sites are coupled and the spins of the Fe<sup>III</sup> ions in the tetrahedral sites are coupled but anti-parallel to the former. The net effect is that the magnetic contributions of both sets are not balanced and there is a permanent magnetism.

### **Properties:**

Fe<sub>3</sub>O<sub>4</sub> is ferrimagnetic with a Curie temperature of 858 K. There is a phase transition at 120K, the so-called Verwey transition where there is a discontinuity in the structure, conductivity and magnetic properties. This effect has been extensively investigated and whilst various explanations have been proposed, it does not appear to be fully understood.

$\text{Fe}_3\text{O}_4$  is an electrical conductor with conductivity significantly higher ( $\times 10^6$ ) than  $\text{Fe}_2\text{O}_3$ , and this is ascribed to electron exchange between the  $\text{Fe}^{\text{II}}$  and  $\text{Fe}^{\text{III}}$  centres.

**Uses:**

- ❖  $\text{Fe}_3\text{O}_4$  is used as a black pigment and is known as C.I pigment black 11 (C.I. No.77499) or Mars Black.
- ❖  $\text{Fe}_3\text{O}_4$  is used as a catalyst in the Haber process and in the water gas shift reaction. The latter uses an HTS (high temperature shift catalyst) of iron oxide stabilised by chromium oxide. This iron-chrome catalyst is reduced at reactor start up to generate  $\text{Fe}_3\text{O}_4$  from  $\alpha\text{-Fe}_2\text{O}_3$  and  $\text{Cr}_2\text{O}_3$  to  $\text{CrO}_3$ .
- ❖ Nano particles of  $\text{Fe}_3\text{O}_4$  are used as contrast agents in MRI scanning.
- ❖ Ferumoxitol, also known as Feraheme and Rienso, is an intravenous  $\text{Fe}_3\text{O}_4$  preparation for treatment of anemia resulting from chronic kidney disease. Ferumoxitol is manufactured and globally distributed by AMAG Pharmaceuticals.
- ❖ Along with sulfur and aluminium, it is an ingredient in a specific type of thermite useful for cutting steel.

The Manduram is useful in the following conditions:

The various preparations are made from red oxide of iron. They are useful in anaemic and dropsy<sup>23</sup>.

Swelling of the lassitude, Fever associated with bone disorders severe anasarca and paleness, wheezing dropsy due to abdomen enlargement, Pallor, Asthma and Gonorrhoea. It improves the hemopoiesis.

The Manduram should not be used in chronic diseases associated with loss appetite, constipation and when there is fever<sup>21</sup>.

Mandura is especially useful in anaemia, amenorrhoea, dysmenorrhoea, menorrhagia, chlorosis; also diarrhoea, chronic bowel complaints, dyspepsia, intestinal worms and nervous diseases; neuralgia of the 5<sup>th</sup> nerve due to debility, kidney diseases, albuminuria<sup>22</sup>.

## 2. COW URINE

Our ancient peoles like identify cow urine as a powerful medicine. They called it Panchagavya. The treatment of disease using products obtained from cows milk, curd, ghee, urine and dung. Cow urine when used as a form of medicine and also helps to medicine preparations. There are many types of cows. We will refer to the Indian cow. Cow urine has many medicinal properties, vitamins, enzymes and bio-active substances that aid in treating many diseases.

### **The Main Elements of Cow Urine and Their Functions:**

Many useful elements have been found in urine. Some of them are as below:

#### **Urea:**

Urea is a major element found in urine and is the end product of protein metabolism. It is strong antibacterial agent.

#### **Uric acid:**

Uric acid is similar to Urea and has strong antibacterial properties. In addition it helps to control cancer-causing substances.

#### **Minerals:**

Minerals from urine can be very easily reabsorbed as compared to those derived from food. Urine probably contains more different types of minerals than those derived from food. Urine becomes turbid if left alone for a while This is because when enzyme present in urine dissolve urea and change it into ammonia then urine becomes strongly alkaline making it difficult to dissolve rich minerals. Therefore stale urine looks turbid this does not mean that it has decayed Urine with higher ammonical disorder content when applied to the skin plays an important role in beautifying it.

#### **Bioactive substance and hormones**

**Urokinase:** Dissolves blood clots, helps in curing heart diseases and improves blood circulation.

**Epithelium growth factor:** Helps, repair and regenerate damaged tissues and cells.

**Colony stimulating factor:** It is effective for cell division and multiplication.

**Growth hormone:** Shows different bioactive effects such as promotion of protein production, cartilage growth, and fat decomposition.



**Erythropoietine:** Promotes production of red blood cells.

**Gonadotropins:** Promotes normalization of menstrual cycle and sperm production

**Kallikrin:** -Releases kallidin that expands peripheral veins and reduce blood pressure.

**Tripsyn inhibitor:** Effective for prevention and healing of muscular tumour.

**Allantoine:** Heals wounds and tumours.

**Anti-cancer substance:** Anti-neoplaston, H-11 beta-iodole-acetic acid, directine, 3-methyl gloxal, etc. differ from chemotherapeutic drugs, which kill or injure all kinds of cells. They strongly prevent the multiplication of carcinogenic cells and return them to normal.

**Nitrogen:** It is diuretic & stimulates kidney naturally.

**Sulphur:** It increases intestinal peristalsis and purifies blood.

**Ammonia:** It maintains integrity of body tissues and blood.

**Copper:** It checks excessive deposition of fat.

**Iron:** It maintains RBC counts in blood and stabilizes stamina.

**Phosphate:** It has lithotriptic action.

**Sodium:** It purifies the blood and checks hyperacidity.

**Potassium:** It is appetizer and eliminates muscle fatigue.

**Magnese:** It is antibacterial and prevents gas gangrene.

**Carbolic Acid:** It is antibacterial and prevents gas gangrene.

**Calcium:** It purifies blood & provides nutrition to bones; helps in coagulation of blood.

**Salts:** Antibacterial, Prevents Comma, and ketoacidosis.

**Vitamin A, B, C, D, E:** They prevent excessive thirst, infuses vigour, and increase potency.

**Lactose Sugar:** Gives strength to heart, checks excessive thirst and giddiness.

**Enzymes:** Improve immunity, and promote the secretion of digestive juices.

**Water;** Controls the body temperature maintains the fluidity of blood.

**Hippuric Acid:** Excrete toxins through the urine.

**Creatinine:** It is antibacterial.

**Swama Kshar:** Antibacterial, improves immunity, and acts as an antidote.

Some hormones presents in 8-month pregnant cow which are very good for health<sup>14</sup>.

## **RESEARCH ARTICLES PUBLISHED IN JOURNALS:**

### **1. Review Article Benefits of Cow Urine – A Review<sup>25</sup>**

**Sahu Rekha, Lalchand, G1upta Rakshapal and Rout OmPrakash**

#### **ABSTRACT:**

The Cow urine has been used from ancient times for curing many ailments of human beings. It is important and essential part of PanchgavyaChikitsa. DiffferntAyurvedic literature have mentioned its importance and uses for treatment of, Kushtha, Kandu, Udarrog, Colic, Abdominal tumour, Enlargement of the abdomen and Flatulence, for therapies such as decoction purgation, enema etc. Many researches have also be done, which shows its use for treatment of Skin diseases, Stomach diseases, kidney diseases, Heart diseases, Stones, Diabetes, Liver problem, Jaundice, Athletes feet, cyst, Hemorrhoid etc. and show its Immunostimulant, Bioenhencer, Anticonvulsant, Anti cancerous, Wound healing, Antioxidant and Antimicrobial properties. It is also useful in agriculture forpreparation ofvermicompost and biopesticides. This review article will collect all the qualities and uses of Cow urine from different Ayurvedicand modern literature. The article will also collect the data from all researches done on Cow urine. Cow urine is excellent bioenhencer and recently Cow urine distillate has been granted U.S. patents. Further researches are required to prove its qualities and benefits. Public awareness is required to promote the importance and wide applications of cow urine to improve their health and lifestyle.

### **2. Chemotherapeutic potential of cow urine: A review<sup>26</sup>**

**GurpreetKaur Randhawa and Rajiv Sharma**

#### **ABSTRACT**

In the grim scenario where presently about 70% of pathogenic bacteria are resistant to at least one of the drugs for the treatment, cue is to be taken from traditional/indigenous medicine to tackle it urgently. The Indian traditional knowledge emanates from ayurveda, where Bosindicus is placed at a high pedestal for numerous uses of its various products. Urine is one of the products of a cow with many benefits

and without toxicity. Various studies have found good antimicrobial activity of cow's urine (CU) comparable with standard drugs such as ofloxacin, cefpodoxime, and gentamycin, against a vast number of pathogenic bacteria, more so against Gram-positive than negative bacteria. Interestingly antimicrobial activity has also been found against some resistant strains such as multidrug-resistant (MDR) *Escherichia coli* and *Klebsiella pneumoniae*. Antimicrobial action is enhanced still further by it being an immune-enhancer and bioenhancer of some antibiotic drugs. Antifungal activity was comparable to amphotericin B. CU also has anthelmintic and antineoplastic action. CU has, in addition, antioxidant properties, and it can prevent the damage to DNA caused by the environmental stress. In the management of infectious diseases, CU can be used alone or as an adjunctive to prevent the development of resistance and enhance the effect of standard antibiotics.

### **3. Evaluation of antidiabetic, antioxidant effect and safety profile of gomutra ark in Wistar albino rats<sup>27</sup>**

**Devender O. Sachdev, Devesh D. Gosavi, and Kartik J. Salwe**

#### **ABSTRACT**

The effect of Gomutra ark (GoA) on experimental alloxan-induced diabetes in rats was studied. For this purpose, Wistar albino rats of either sex weighing 200-250 g were used. The biochemical parameters like blood sugar, vitamin C, and malondialdehyde release were measured. The safety profile of GoA was evaluated using acute and chronic toxicity studies. GoA significantly lowers blood glucose in diabetic rats although the observed effect was found to be less than glibenclamide. It significantly lowers the level of malondialdehyde and vitamin C in diabetic rats. No toxicity was observed even when cow urine was given 32 times of the study dose in acute toxicity and no significant changes were seen when it was used chronically, which suggests that cow urine is having a very high therapeutic index. This study supports the traditional use of GoA in diabetes and is having a high therapeutic index and is safe for chronic use. However, further studies are needed to elucidate the mechanism of action of Gomutra ark.

#### **4. Clinical Evaluation of Cow-Urine Extract special reference to Arsha (Hemorrhoids)<sup>28</sup>**

**Dr.Omaprakash W.Talokar, Dr.Archana R. Belge, Dr.Raman S. Belge**

##### **ABSTRACT:**

There are various traditional healing practices in India including Herbal therapies and other forms of alternate therapies which are non-clinical. Based on certain traditional and Ayurvedic point of view, consumption of Gomutra (Cow-Urine) is a traditional remedy for various health conditions e.g. Arsha (Hemorrhoids). Cow-urine therapy is an ancient therapy part of Ayurveda. Cow-urine tries to balance the body elements by re-establishing the equilibrium for a healthy body. Hemorrhoids are a common anorectal condition defined as the symptomatic enlargement and distal displacement of the anal mucosa. An inflammatory reaction and vascular hyperplasia may be present in Hemorrhoids. The present research paper deals with the oral supplementation of Cow-urine in hemorrhoids patients, which has prevented the time-consuming, painful and expensive complications of Hemorrhoids.

#### **5. Clinical Trial of Gomutra (Cows Urine) In Obesity Management<sup>29</sup>**

**Naveen Kumar Saini**

##### **ABSTRACT**

The current research paper describes the importance of Gomutra (cow's urine) in obesity management. For this purpose 30 patients were selected randomly from M.M.M Government Ayurvedic College & Associated Group of hospitals, Udaipur. For diagnostic purpose objective parameters like total body weight of patient, BMI, Measurement of skin-fold thickness, Circumference of Chest, Abdomen, Hip, Mid-thigh, biochemical analysis like lipid profile and subjective parameters like Chalatra, Kshudra Swasa, Daurbalya, Anga Gaurva, Alasya, Gatrāsada, Alpa Vyavaya, Ati Kshudha, Ati Piapasa, Nidradhikya, Swedadhikya, Daurgandhya, Snigdhangta, Sandhishool were taken in to consideration. In pathogenesis of Sthaulya, Kapha (Kledaka Kapha), Vata (Samana & Vyana Vayu), Meda (fat/lipid) and Medodhatvagni Mandyata are main responsible factors according to our samhitas. My hypothesis for this evaluation was

based on the facts that Gomutra has all those properties which can be helpful in Samprativighatana of obesity i.e. mTikshna, Ushna, Laghu and Kaphavatshamak etc. I also considered the biochemical analysis on Gomutra and its elemental properties. Keeping this in mind Gomutra was given to every patient according to their age and Kothagni ranging from 3ml to 5ml with water and all changes were calculated by parameteric and non parameteric tests. In this study cows urine proved very effective in obesity management reduced weight and B.M.I by 6.51% and 6.11% respectively. This research is very important in today's life because the problem of obesity is increasing day by day due to our sedentary life style and it is leading to very fatal diseases.

### 3. PIPER BETLE

#### Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Clade	: Magnoliids
Order	: Piperales
Family	: Piperaceae
Genus	: Piper
Species	: P. betle

#### Binomial name:

Piper betle

The betel (Piper betle) is the leaf of a vine belonging to the Piperaceae family, which includes pepper and kava. Betel leaf is mostly consumed in Asia and elsewhere in the world by some Asian emigrants, as betel quid or in paan, with Areca nut and/or tobacco.

In India and Sri Lanka a sheaf of betel leaves is traditionally offered as a mark of respect and auspicious beginnings. Occasions include, greeting elders at wedding ceremonies, New Year, offering payment to Ayurvedic physicians and astrologers where usually money and/or areca nut are kept on top of the sheaf of leaves and offered to the elders for their blessings.

The betel plant is an evergreen perennial, with glossy heart-shaped leaves and white catkin. The betle plant originated in South and South East Asia.

#### Names in different languages

The betle leaf is known as Pan in Bengali and Paan in Urdu and Hindi, Tambula and Nagavalli in Sanskrit, and Tanbul in Persian. Some of the names in the regions in which it is consumed are: Mlou(Cambodian), Tamalapaku(Telugu),

Naagarvelnapaan (Gujarati), veelyadaye (Kannada), Vettila (Malayalam), Kun (Burmese), Plū (Mon), Malus (Tetum), Maluu (Khmer), Plū (Thai), Bulath (Sinhalese), Malu (Tokodede), Bileiy (Dhivehi), bulungsamat (Kapampangan), daunsirih (Malaysian), daunsirih/suruh (Indonesian), Kebui (Palauan), Pupulu (Chamorro), Ikmo (Tagalog), Gawed (Ilokano), and Trầu (Vietnamese), Gaweud/Gawed in (Kalinga), Buyo (Bikol).

### **Etymology**

Betle, derived from the Tamil/Malayalam word vettila, via Portuguese.

### **Usage and cultural significance**

The primary use of betle leaf is as a wrapper for the chewing of areca nut or tobacco where it is mainly used to add flavour. It may also be used in cooking, usually raw, for its peppery taste.

### **Health effects**

Some reports may suggest that betle leaf by itself has adverse health effects, in part because of tannins delivered by the leaf and for reasons currently not fully understood. For example, one research paper studied chromosome damaging effect of betel leaf in human leukocyte cultures. These researchers report an increase in the frequency of chromatid aberrations when the leaf extract was added to cultures. Another scientific study from Japan indicates that the lab rats that ate a mixture of betel leaf and areca nuts all had severe thickening of the upper digestive tract whereas after undergoing a diet of betel leaves alone, only one laboratory rat ended up having a forestomach papilloma<sup>30</sup>.

## **RESEARCH ARTICLES PUBLISHED IN JOURNALS:**

### **1. New chemical constituents from the Piper betle Linn. (Piperaceae)<sup>31</sup> - AkhtarAtiya, BarijNayanSinha& Uma RanjanLal**

#### **ABSTRACT**

The phytochemical investigation of chloroform extract from Piper betle var. haldia, Piperaceae, leaves has resulted in the isolation of two new chemical constituents which were identified as 1-n-dodecanyloxy resorcinol (H1) and desmethylenesqualenyldeoxy-

cepharadione-A (H4), on the basis of spectroscopic data 1D NMR (<sup>1</sup>H and <sup>13</sup>C) and 2D NMR (<sup>1</sup>H-<sup>1</sup>H COSY and HMBC) as well as ESI-MS, FT-IR and HR-ESI-MS analyses. Compounds H1 and H4 showed excellent antioxidant DPPH free radical scavenging activity with IC<sub>50</sub> values of 7.14 µg/mL and 8.08 µg/mL compared to ascorbic acid as a standard antioxidant drug with IC<sub>50</sub> value of 2.52 µg/mL, respectively. Evaluation of cytotoxic activity against human hepatoma cell line (PLC-PRF-5) showed moderate effect with the GI<sub>50</sub> values of 35.12 µg/mL for H1, 31.01 µg/mL for H4, compared to Doxorubicin® as a standard cytotoxic drug with GI<sub>50</sub> value of 18.80 µg/mL.

## **2. Biotechnological intervention in betelvine (Piper betle L.): A review on recent advances and future prospects<sup>33</sup>**

**SuryasnataDas, ReenaParida, I.SriramSandeep, SanghamitraNayak, SujataMohanty**

### **ABSTRACT**

Betelvine (Piper betle L.) is cultivated for its deep green heart shaped leaf for (15–20) million Indian and 2 billion foreign consumers annually. The crop provides Rs (6 000–7 000) million of national income per year and at the same time leaves worth Rs (30–40) million is exported to other countries. The leaves are not only used directly for chewing purposes but also possesses antioxidant, anti-inflammatory, anti-apoptotic, anti-cancer and anti-microbial properties. Besides, the leaves also contain eugenol rich essential oil (1%–3%) which is the source for medicine, stimulant, antiseptic, tonic and other ayurvedic formulations. The essential oil also contains chavibetol, caryophyllene and methyl eugenol which are the potent source for preparation in ayurvedic medicine and herbal products. Cost of betelvine essential oil is 10\$ per 5 mL. In spite of its great economical and medicinal importance betelvine is still neglected by the researchers for proper characterization and authentication for selection of elite landraces. Lack of awareness among people, use of same planting material for many generations, existing of many synonyms for a single landraces, no proper characterization of available landraces are some of the significant constraints for its commercialization. Our review endeavours a complete advance in the research on betelvine, existing lacunae for its proper characterization and commercial cultivation. It also attempts to provide a comprehensive account on biotechnological



interventions made in betelvine aimed at complementing conventional programmes for improvement of this nutraceutically important cash crop.

### **3. A Review: Nutraceuticals Properties of Piper betel (Paan)<sup>33</sup>**

**Ekta Singh Chauhan, Jaya Aishwarya\*, Akriti Singh and Anamika Tiwari**

#### **ABSTRACT**

Piper betel or Betel vine deep green heart shaped vary famous leaves belongs to the family Piperaceae called Paan leaves in India; rich in nutrients, minerals, vitamins, antioxidants, phytochemicals. Piper betel is mostly use to chew with sliced areca nut, slaked lime, coriander, aniseed, clove, cardamom, sweetener, coconut scrapings etc, but less used remedy. It is cultivated in hotter and damper part in country following the traditional methods in India on about 55,000 hectare with an annual production worth about Rs 9000 million. Focusing on traditional use and medicinal use of Piper betel we can cure many diseases and reduce the oral cancer which actually happens due to sliced areca nut, slaked lime not because of betel leaves. Leaves are rich in many nutrients like water, energy, protein, fats, fiber, calcium and iron etc. and the antioxidants present are flavonoids, tannins, saponins alkaloids, terpenoids etc. Piper betel helps in curing various diseases like diabetes, hypertension, brain toxin, halitosis, boils and abscesses, obesity, wound healing, voice problems, conjunctivitis, constipation, headache, hysteria, itches, mastitis, mastoiditis, leucorrhoea, otorrhoea, ringworm, swelling of gum, rheumatism, abrasion, cuts and injuries etc. So, we have to highlight these nutrients rich betel leaves and its benefits. This paper put a light on nutraceuticals properties of betel leaves and says that cultivation and use of betel leaves should be increased to cure the diseases.

### **4. Pharmacognostic Study on the Leaf of Piper betle L.<sup>34</sup>**

**Swe Mar Tin**

#### **ABSTRACT**

Specimens were identified according to Hooker (1879), Kirtikar and Basu (1933), Backer (1963), Hutchinson (1967), Brandis (1971) and Dassanayake (1987). Fresh and powder leaves of Piper betle L. were studied with the methods of Wallis

(1967), Trease and Evans (1978) and Evans (2002). Elemental analysis was conducted by using Energy Dispersive X-Ray Fluorescence (EDXRF) and Atomic Absorption Spectrophotometry (AAS) methods. Piper betle L. contained the highest Mg concentration having  $8.412 \pm 0.007$  ppm. Various solvents extracts of leaves showed the antimicrobial activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus pumalis*, *Candida albicans* and *Escherichia coli*. Water extract of Piper betle L. showed activity against *Bacillus subtilis* respectively.

## **5. Antioxidant and non toxic properties of Piper betle leaf extract: in vitro and in vivo studies<sup>35</sup>**

**DharamaenderChoudharyRaosaheb K. Kale**

### **ABSTRACT**

Piper betle leaves are used in folk medicine for the treatment of various disorders and is commonly chewed among Asians. The present study investigates the protective efficacy of P. betle leaf extract. The presence of the extract inhibited the radiation induced lipid peroxidation process effectively. This could be attributed to its ability to scavenge free radicals involved in initiation and propagation steps. Oral supplementation with extract (1, 5 and 10 mg/kg) was administered daily for 2 weeks to Swiss albino mice and the hepatic antioxidant status was analysed. The GSH content was enhanced and no appreciable change was found in the levels of oxidative damage in terms of lipid peroxidation. Also, the specific activity of SOD increased in a dose dependent manner. These factors indicate the elevation of antioxidant status in the animals. The effect on the glyoxalase system which is considered to be activated under stress conditions was also investigated. Our findings did not observe any significant change in gly I and gly II activities, implying a nonstress condition after oral treatment of the extract. The present study indicates the antioxidant activity of P. betle leaf extract and its potential to elevate the antioxidant status.

## 4. VITEX NEGUNDO

*Vitex negundo*, commonly known as the **Chinese chaste tree**, **Five-leaved chaste tree**, or **horseshoe vitex**, is a large aromatic shrub with quadrangular, densely whitish, tomentose branchlets. It is widely used in folk medicine<sup>36</sup>.

### Other Names:

Sans: Sephalika; Nirgundi; Svetasurasa; Vrikshaha; Sindhuvaram.

Eng: Five-leaved Chaste Tree.

Fr: Gattilierincise.

Hind: Sambhalu; Sawbhalu; Nirgundi; Nisinda; Mewri.

Ben: Nishinda; Nirgundi; Samalu.

Bom: Katri; Nirgundi; Shiwari; Nirgunda; Nisinda.

Mah: Nirgunda

Gwalior: Nigad.

Guj: Nagoda; Shamalic.

Tel: Sindhuvaruma; Tellavavilli; Vavili; Nalla-vavili.

Tam: Chinduvaram; Nirnochi; Nochchi; Notchi; Vellai-noch-chi.

Mal: Indrani.

Can: Bile-nekki.

Burm: Kiyon-bhanbin.

Pers: Pajankusut.

Punj: Marwan; Maura; Banna; Torbanna; Swanjan; Mawa; Amalu (roots and leaves); Bari (fruit).

### Habitat:

Bengal, Southern India and Burma.

**Parts used:** Root, fruit, flowers, leaves and bark.

**Constituents:**

Leaves contain a colourless essential oil resin of the odour of the drug, and a resin; fruits contain an acid resin, as astringent organic acid, malic acid, traces of an alkaloid and a colouring matter.

**RESEARCH ARTICLES PUBLISHED IN JOURNALS:**

**1. Evaluation of Phytochemical and Antimicrobial study of Extracts of Vitexnegundo Linn<sup>37</sup>**

**GautamKeerti and Kumar Padma, Keertigautam**

**ABSTRACT**

The persistent increase in the number of antibiotic resistant strains of microorganisms has led to the development of more potent but more expensive antibiotics. In most developing countries of the world these antibiotics are not readily affordable, thus making compliance difficult. This calls for research into alternative source of antimicrobials. Present work was carried out to assess the antimicrobial activity of V.negundo against some multidrug resistant pathogenic bacteria. V.negundo flower buds were collected, air dried and soxhlet extracted by using standard method for flavonoid extraction. These extracts were then tested for antimicrobial activity using disc diffusion method. MIC, MBC & TA was also calculated. Flower buds bound flavonoid extract of Vitex showed highest antibacterial activity (IZ=25mm, AI=1.38±0.026) against Bacillus subtilis and (IZ=25mm, AI=1.04±0.010) against Raoultellaplanticola. The minimum inhibitory concentration (MIC) of Vitex was 0.039 mg/ml against Bacillus subtilis, raoultellaplanticola and Agrobacterium tumifaciens. The most active extract of bound flavonoid of flower buds was analyzed by GCMS study, which revealed eighty compounds in it. Two flavonoids were found in the flowers buds of Vitexnegundo, as Kampferol-3-O-rutinoside (RT=30.342) and 5-hydroxy- 3, 6, 7, 3', 4'-pentamethoxy flavones (RT=49.408), that are not has been reported earlier in flower buds of Vitexnegundo. Flavonoids of flower buds extract of V.negundo Linn has the potential to be developed into an antimicrobial agent.

## **2. A Review of Ethnomedicinal Plant-Vitexnegundo Linn<sup>38</sup>**

**FauziyaBasri, H.P. Sharma, SazyaFirdaus, Paras Jain and AlokRanjan**

### **ABSTRACT**

Vitexnegundo belongs to family Verbenaceae and grows as small tree with thin grey bark. The plant is widely distributed and also has pharmacological actions against wide spectrum of diseases in traditional system of medicines. All parts of the plant especially its leaves contain numbers of secondary metabolites such as alkaloids, phenols, flavonoids, glycosidicirridoids, tannins and terpenes. Because of the richness in phytochemicals, the plant is attributed to possess a number of therapeutic uses; antimicrobial, antiinflammatory, astringent, bronchodilator, CNS-depressant, detoxicant, diuretic, emmenagogue, anticancer and hepatoprotective etc. It is also used as repellent, insecticide and larvicidal. Leaf extract is employed as nervinetonic, tranquilizer and vermifuge. This review aims at presenting comprehensive information on phytochemical constituents and therapeutic uses which can be helpful in development of modern medicine.

## **3. Anti-Amnesic Activity of VitexNegundo in Scopolamine Induced Amnesia in Rats<sup>39</sup>**

**Abhinav Kanwall, Jogender Mehla, MadhusudanaKunchal, Vegi Ganga ModiNaidul, Yogendra Kumar Gupta, Ramakrishna Sistla**

### **ABSTRACT**

In the present study we investigated the anti-amnesic activity of Vitexnegundo in scopolamine induced amnesia in rats. Wistar rats (180-200g) were trained on active avoidance task .Each animal received session of 15 trials with inter trial duration of 15s for 5 days. Scopolamine (3mg/kg, i.p) was administered at different time periods on the basis of stages of memory i.e acquisition, consolidation and retention in different groups (n= 6). Effect of Vitexnegundo extract was evaluated and compared to a standard drug, Donepezil. Significant ( $p < 0.05$ ) increase in the avoidance response on the 5<sup>th</sup> session has been observed as compared to 1st session in control group. Scopolamine treatment significantly ( $p < 0.05$ ) reduced the avoidance response compared to control. Extract treated groups shown significant ( $p < 0.05$ ) in-crease in

number of avoidance responses as compared to scopolamine treated groups. Increased oxidative stress in brain after scopolamine treatment, as observed by increase in MDA & decrease in GSH & SOD, was lowered in the groups treated with extracts. AChE activity was also improved after V.negundo treatment. Results of the study have shown that V.negundo treated groups decrease the phenomenon of amnesia by increasing learning of memory through antioxidant effect and decreasing AChE activity.

## 5. ALOE VERA

### Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Clade	: Monocots
Order	: Asparagales
Family	: Asphodelaceae
Subfamily	: Asphodeloideae
Genus	: Aloe
Species	: A. vera

### Binomial name:

Aloe vera

### Synonyms:

Aloe barbadensis Mill.

Aloe barbadensis var. chinensis Haw.

Aloe vera is a succulent plant species of the genus Aloe. An evergreen perennial, it originates from the Arabian Peninsula but grows wild in tropical climates around the world and is cultivated for agricultural and medicinal uses. The species is also used for decorative purposes and grows successfully indoors as a potted plant.

It is found in many consumer products including beverages, skin lotion, cosmetics, or ointments for minor burns and sunburns. There is little scientific evidence of the effectiveness or safety of Aloe vera extracts for either cosmetic or medicinal purposes. Studies finding positive evidence are frequently contradicted by other studies.

Aloe vera leaves contain phytochemicals under study for possible bioactivity, such as acetylated mannans, polymannans, anthraquinone C-glycosides, anthrones, other anthraquinones, such as emodin and various lectins.

**Uses:**

**Research:**

There is little scientific evidence of the effectiveness or safety of Aloe vera extracts for either cosmetic or medicinal purposes. A research study finding positive evidence is frequently contradicted by other studies.

Despite this, the cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturizing, and healing properties of aloe vera.

Two 2009 reviews of clinical studies determined that all were too small and faulty to allow strong conclusions to be drawn. One of the reviews found that Aloe has not been proven to offer protection for humans from sunburn.

There is no good evidence aloe vera is of use in treating wounds or burns. There is no good evidence that topical application of aloe vera is effective for treating genital herpes or psoriasis. A 2014 Cochrane review found no strong evidence for the value of topical application of aloe vera to treat or prevent phlebitis caused by intravenous infusion.

Aloe vera gel is used commercially as an ingredient in yogurts, beverages, and some desserts, although at certain high doses, its toxic properties could be severe whether ingested or topically applied. The same is true for aloe latex, which was taken orally for conditions ranging from glaucoma to multiple sclerosis until the FDA required manufacturers to discontinue its use.

**Dietary supplement:**

Aloin, a compound found in the exudate of some Aloe species, was the common ingredient in over-the-counter (OTC) laxative products in the United States until 2002 when the Food and Drug Administration banned it because the companies manufacturing it failed to provide the necessary safety data. Aloe vera has potential toxicity, with side effects occurring at some dose levels both when ingested and



applied topically. Although toxicity may be less when aloin is removed by processing, Aloe vera that contains aloin in excess amounts may induce side effects.

Aloe vera juice is marketed to support the health of the digestive system, but there is neither scientific evidence nor regulatory approval to support this claim. The extracts and quantities typically used for such purposes appear to be dose-dependent for toxic effects.

### **Traditional medicine:**

Aloe vera is used in traditional medicine as a skin treatment. In Ayurvedic medicine it is called kathalai, as are extracts from agave. For aloe for agave early records of Aloe vera use appear in the Ebers Papyrus from the 16th century BC, and in Dioscorides' De Materia Medica and Pliny the Elder's Natural History – both written in the mid-first century AD. It is also written of in the Juliana Anicia Codex of 512 AD. The plant is used widely in the traditional herbal medicine of many countries.

### **Commodities:**

Aloe vera is used on facial tissues where it is promoted as a moisturizer and anti-irritant to reduce chafing of the nose. Cosmetic companies commonly add sap or other derivatives from Aloe vera to products such as makeup, tissues, moisturizers, soaps, sunscreens, incense, shaving cream, or shampoos. A review of academic literature notes that its inclusion in many hygiene products is due to its "moisturizing emollient effect".

Other potential uses for extracts of Aloe vera include the dilution of semen for the artificial fertilization of sheep, as a fresh food preservative, or for water conservation in small farms. It has also been suggested that biofuels could be obtained from Aloe vera seeds.

### **Toxicity:**

Under the guidelines of California Proposition, orally ingested non-decolorized aloe vera leaf extract has been listed by the OEHHA, along with goldenseal, among "chemicals known to the state to cause cancer or reproductive toxicity".

Use of topical aloe vera is not associated with significant side effects. Oral ingestion of aloe vera, however, may cause abdominal cramps and diarrhea which in turn can decrease the absorption of drugs. IARC studies have found ingested non-decolorized liquid aloe vera to be carcinogenic in animals, and state that it is a possible carcinogen when eaten or ingested by humans as well.

## **RESEARCH ARTICLES PUBLISHED IN JOURNALS:**

### **1. Recent update on the medicinal properties and use of Aloe vera in the treatment of various ailments<sup>41</sup>**

**Gajendra Mahor and Sharique A Ali**

#### **ABSTRACT**

Aloe vera (*Aloe barbadensis*) an herb is widely used in Ayurvedic, Homoeopathic and Allopathic streams for its marvelous medicinal properties. This plant is one of the richest natural sources of health for mammals including human beings. The chemistry of the plant has revealed the presence of more than 200 different biologically active substances, which include antimicrobial, antibacterial, antifungal, antiviral, activities of the nonvolatile constituents of the leaf gel. Aloe species are widely distributed in the African and the eastern European continents, and are spread almost throughout the world. The genus Aloe has more than 400 species but few, such as A. Vera, Aloe ferox, and Aloe arborescens, are globally used for trade. Many biological properties associated with Aloe species are contributed by inner gel of the leaves. anti diabetic, anti-inflammatory, peptic ulcers, antitumor, anticancer Properties, activity effects on the Immune System, adverse reactions, Laxative effects, wound healing, antiseptic, vitamins, minerals, enzymes, amino acids, stress, sugars. It is known to help slow down the appearance of wrinkles and actively repair the damaged skin cells that cause the visible signs of aging. Aloe is a powerful detoxifier, antiseptic and tonic for the nervous system. Aloe vera gel contains a large range of vitamins even vitamin B12, Vitamin A, contains B-Group vitamins, Vitamin C, Vitamin E and folic acid. Aloe vera gel contains important ingredients including 19 of the 20 amino acids needed by the human body and seven of the eight essential ones that just cannot be made. The plantleaves and inner gel contains numerous help it has potential to cure sunburns and minor cuts, and even

skin cancer and also acts as extremely powerful laxative. Various parts of the plant have different effects on the body. The present review is an attempt to highlight the proven research related botanical and pharmacological medicinal properties of Aloe vera.

## **2. Aloe vera their chemicals composition and applications: A review**

**Sharraf Moghaddasi M, Sandeep Kumar Verma<sup>42</sup>**

### **ABSTRACT:**

It was known to people in Egypt and also Greece for example Aristotle explains special characteristics of Aloe vera. Gelatin that is extracted from this plant is continuously used to treat burns, cuts and inflamed scars since many years. It is useful for skin damaged from X ray as reported in many researches in journals related x rays. On the other hand concentration of glucose in gelatin, results in high osmotic pressure, that protect skin from live bacteria. Aloe vera includes "Anthraquinone" chemicals that are known as anti virus, anti bacteria and anti cancer. Aloe vera (Aloe vera) has 400 species but just 2 species; *A. barbadensis* are used for trade in the world. This plant needs very less water for living and also can survive on saline soils, beaches and is resistance to diseases and insects. It can live in very hot regions, but cannot tolerate cold. Aloe vera grows in, Mexico, India, South and central America, Africa, Australia, Caribbeans and Iran. This paper reviews history, its chemicals, medical usage, plant morphology, extracts and agronomy of Aloe vera.

# *Materials And Methods*

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## 4. MATERIALS & METHODS

### 4.1. Selection of the drug:

The test drug Mandura Chenthooram was selected for the evaluation of toxicity studies in wistar albino rats.

#### Ingredients:

- Manduram (Ferroso ferric oxide or Iron oxide)
- Koneer (Cow's urine)
- Vettrilai charu (*Piper betle* juice)
- Notchiilai charu (*Vitex negundo* juice)
- Vellattu paal (Goat milk)
- Vellattu neer (Goat urine)
- Kumari charu (*Aloe vera*)<sup>1</sup>

#### MANDURAM



#### PASUNEER

(COW URINE)



## **VETRILAI**



## **NOTCHI**



## **VELLATTUNEER**

**(GOAT URINE)**



## **VELLATTUPAAL**

**(GOAT MILK)**





## KATRAZHAI



**PREPARATION  
OF  
THE DRUG**



## **4.2. COLLECTION, AUTHENTICATION, PURIFICATION AND PREPARATIO OF THE TEST DRUG:**

### **Collection:**

Manduram (Ferroso ferric oxide) was procured from a well reputed country shop in chennai. The following herbal drugs such as Vettrilai (Piper betle), Katrazhai (Kumari-Aloe Vera) procured from Tambaram market, Chennai. Then Notchi (Vitex negundo) collected from NIS Campus Chennai. Pasuneer (Cow urine), Vellattuneer (Goat urine), Vellattupaal (Goat milk) were collected from village in Paruvakkudi.

### **Identification and Authentication of the raw drug:**

The herbal drugs were identified and authenticated by from the department of Medicinal Botany, NIS Tambaram sanatorium, Chennai. **(Certificate no: NISMB2822017, 06.03.2017)**. The metal drug was identified and authenticated by from the Department of Gunapadam, NIS, Tambaram Sanatorium, Chennai. **(Certificate no: F.No:NIS/Gunapadam/Au/2017/5, 03.04.2017)**.

### **Purification:**

Hot flame the 3 palams of manduram in the kannan ulai. Dip the flamed manduram 7 times in Pasuneer (cow's urine). Then wash with water and dry it. Grind the dried manduram and keep it in katra. Pour Vettrilai charu (juice) in katra above the level of dried manduram and keep it in sunlight for 3 days by maintaining the juice level. Then pour Notchiilai charu (Vitex negundo leaf juice), Vellattupaal (Goat milk), Vellattuneer (Goat's urine) one by one like Vettriali charu (juice)<sup>1</sup>.

## UNPURIFIED MANDURAM



## AT THE TIME OF PURIFICATION PROCESS









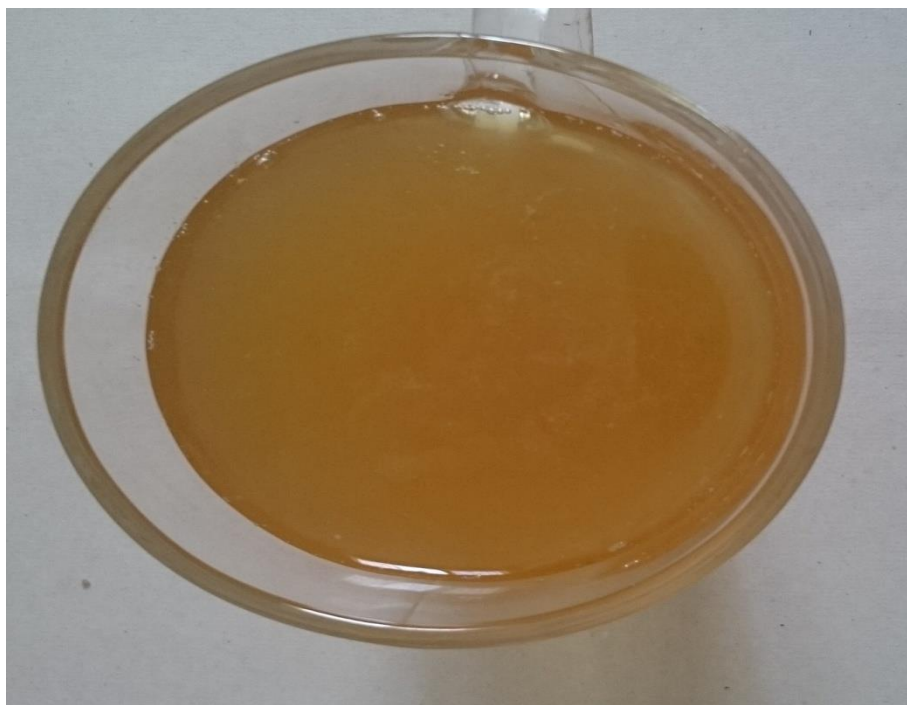
## **AFTER PURIFICATION**



### **Preparation of Mandura Chenthooram:**

Grind purified Manduram with aloe vera juice for 4 samams (12hrs) and make it into one villai. Dry it in sunlight and put it in a small agal (Pot) cover with suitable agal and tightly sealed with seelai. Use 50 dried cow dung, for the pudam. After the pudam has done, open the seelai and look for red colour which is the indication for better finishing of medicine. Then grind the medicine with aloe vera juice for 4 samams when attaining the mezhughu patham, make villai and dry it in sunlight. Place the dried villai in agal and tightly sealed with seelai. Again pudam has done using 50 dried cow dung<sup>1</sup>.

## **KATRAZHAI CHARU (KUMARI CHARU)**







### **MANDURA CHENTHOORAM**



**Therapeutic dose:**

The dose is equivalent to **1/2 - 1 kuntri** (65-130mg), twice daily after food. The duration of treatment is 10-12 days.

**Adjuvent:**

As per literature Mandura Chenthooram is administered along with honey.

**Therapeutic uses:**

- ✓ Anaemia(*Paandu*),
- ✓ Dropsy(*Sobai*),
- ✓ Jaundice(*Kaamalai*),
- ✓ Ascites(*Peruvayiru*),
- ✓ Cough(*Eelai*),
- ✓ Diarrhoea (*Kirani*).

**It improves the Hemopoisis<sup>1</sup>.**



# QUALITATIVE ANALYSIS

## STANDARDIZATION OF MANDUARA CHENTHOORAM

### 4.3. QUALITATIVE ANALYSIS:

#### I. PHYSICO-CHEMICAL ANALYSIS OF – MANDUARA CHENTHOORAM

The physico- chemical properties of **Mandura Chenthooram** is carried as per Standard procedure at The Tamilnadu Dr.M.G.R.Medical University, Guindy, Chennai.

##### 1. Loss on Drying:

An accurately weighed 2g of **Mandura Chenthooram** formulation was taken in a tarred glass bottle. The crude drug was heated at 105<sup>0</sup>C for 6 hours in an oven till a constant weight. The Percentage moisture content of the sample was calculated with reference to the shade dried material.

##### 2. Determination of total ash:

Weighed accurately 2g of **Mandura Chenthooram** formulation was added in crucible at a temperature 600<sup>0</sup>C in a muffle furnace till carbon free ash was obtained. It was calculated with reference to the air dried drug.

##### 3. Determination of acid insoluble ash:

Ash above obtained, was boiled for 5min with 25ml of 1M Hydrochloric acid and filtered using an ash less filter paper. Insoluble matter retained on filter paper was washed with hot water and filter paper was burnt to a constant weight in a muffle furnace. The percentage of acid insoluble as calculated with reference to the air dried drug.

##### 4. Determination of water soluble ash:

Total ash 1g was boiled for 4min with 25ml water and insoluble matter collected on an ash less filter paper was washed with hot water and ignited for 15 min at a temperature not exceeding 450<sup>0</sup>C in a muffle furnace. The amount of soluble ash is determined by drying the filtrate.

#### **5. Determination of water soluble Extractive:**

5gm of dried drug, coarsely powdered **Mandura Chenthooram** was macerated with 100ml of distilled water in a closed flask for twenty- four hours, shaking frequently. The solution was filtered and 25 ml was evaporated in a tarred flat bottom shallow dish, further dried at 100<sup>0</sup>C and weighted. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

#### **6. Determination of alcohol soluble Extractive:**

2.5gm. of air dried drugs; coarsely powdered **Mandura Chenthooram** was macerated with 50 ml. Alcohol in closed flask for 24 hrs. With frequent shaking, it was filtered rapidly taking precaution against los of alcohol. 10ml of filtrate was then evaporated in a tarred flat bottom shallow dish, dried at 100<sup>0</sup>C and weighted. The percentage of alcohol soluble extractive was calculated with reference to air dried drug.

## II. BIO-CHEMICAL ANALYSIS:

The bio-chemical analysis of **Mandura chenthooram** as done at Biochemistry lab National Institute of Siddha, Chennai-47.

S.NO	EXPERIMENT	OBSERVATION
1.	<b>Appearance of the sample</b>	Dark red in colour
2.	<b>Solubility:</b>  A little of the sample is shaken well with distilled water	Sparingly soluble
3.	<b>Action of heat:</b>  A small amount of the sample is taken in a dry test tube and heated gartly at first and then strong.	White fumes evolved
4.	<b>Flame test:</b>  A small amount of the sample is made into a paste with con.HCL in a watch glass and introduced into non luminous part of the Bunsen flame.	Bluish green flame not appeared.
5.	<b>Ash test:</b>  A filter paper is soaked into a mixture of sample and cobalt nitrate solution and introduced into the Bunsen flame and ignited	No yellow colour flame

### Preparation of extract:

5 gm of **Mandura Chenthooram** is weighed accurately and placed in a 250ml clean beaker and added with 50 ml of distilled water. Then it is boiled well for about 10 minutes. Then it is cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water.

**I. Test for Acid Radicals:**

S.NO	EXPERIMENT	OBSERVATION
1.	<b>Test for sulphate:</b>  2ml of the above prepared extract is taken in a test tube to this added 2ml of 4% ammonium oxalate solution.	Cloudy appearance present.
2.	<b>Test for chloride:</b>  2ml of the above prepared extract is added with diluted $\text{HNO}_3$ till the effervescence ceases. Then 2 ml of silver nitrate solution is added.	No cloudy appearance present.
3.	<b>Test for phosphate:</b>  2ml of the extract is treated with 2ml of ammonium molybdate solution and 2ml of con. $\text{HNO}_3$ .	No cloudy yellow appearance present.
4.	<b>Test for carbonate:</b>  2ml of the extract is treated with 2ml magnesium sulphate solution.	Cloudy appearance present.
5.	<b>Test for sulphide:</b>  1gm of the substance is treated with 2ml of con HCL.	No rotten egg smelling gas evolved.
6.	<b>Test for Fluoride and oxalate:</b>  2ml of extract is added with 2ml of dil.Acetic acid and 2ml calcium chloride solution and heated.	No cloudy appearance.
7.	<b>Test for nitrite:</b>  3 drops of the extract is placed on a filter paper, on those 2drops of acetic acid and 2 drops of benzidine solution is placed.	No characteristic changes.

8.	<b>Test for borate:</b>  2 pinches of the substance is made into paste by using sulphuric acid and alcohol (95%) and introduced into the blue flame.	Bluish green colour flame not appeared.
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## II. Test for basic radicals:

1.	<b>Test for lead:</b>  2ml of the extract is added with 2ml of potassium iodide solution.	No yellow precipitate is obtained.
2.	<b>Test for copper:</b>  One pinch of substance is made into paste with con HCL in a watch glass and introduced into the non luminuous part of flame.	No Blue colour flame not appeared.
3.	<b>Test for aluminium:</b>  2ml of the extract sodium hydroxide is added in drops to excess.	No Characteristics changes.
4.	<b>Test for iron:</b>  2ml of extract add 2ml of ammonium thiocyanate solution and 2ml of con HNO <sub>3</sub> is added.	Blood red colour appeared
5.	<b>Test for zinc:</b>  2ml of the extract sodium hydroxide solution is added in drops to excess.	No White precipitate is formed.
6.	<b>Test for calcium:</b>  2ml of the extract is added with 2ml of 4% ammonium oxalate solution.	Cloudy appearance and white precipitate obtained.
7.	<b>Test for magnesium:</b>  2ml of extract sodium hydroxide solution is added in drops to excess.	No White precipitate is obtained.

8.	<b>Test for ammonium:</b>  2ml of extract few ml of Nessler's reagent and excess of sodium hydroxide solution are added.	No brown colour appeared.
9.	<b>Test for potassium:</b>  A pinch of substance is treated with 2ml of sodium nitrite solution and then treated with 2ml of cobalt nitrate in 30% glacial acetic acid.	No yellowish precipitate is obtained.
10.	<b>Test for sodium:</b>  2 pinches of the substance is made into paste by using HCL and introduced into the blue flame of Bunsen burner.	No yellow colour flame appeared.
11.	<b>Test for mercury:</b>  2ml of the extract is treated with 2ml of sodium hydroxide solution.	No yellow precipitate is obtained.
12.	<b>Test for arsenic:</b>  2ml of the extract is treated with 2ml of sodium hydroxide solution	No brownish red precipitate is obtained.

### III. Miscelloneus:

1.	<b>Test for starch:</b>  2ml of extract is treated with weak iodine solution.	Sky blue colour developed.
2.	<b>Test for reducing sugar:</b>  5ml of benedict's qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes are noted.	No brick red colour developed.

3.	<b>Test for the alkaloids:</b>  a. 2ml of the extract is treated with 2ml of potassium iodide solution.  b. 2ml of extract is treated with 2ml of picric acid.  c. 2ml of the extract is treated with 2ml of phosphor tungstic acid.	Yellow colour developed.
4.	<b>Test for tannic acid:</b>  2ml of extract is treated with 2ml of ferric chloride solution.	No black precipitate is obtained
5.	<b>Test for unsaturated compound:</b>  2ml of extract 2ml of potassium permanganate solution is added.	Potassium permanganate is not decolourised.
6.	<b>Test for amino acid:</b>  2 drops of the extract is placed on a filter paper and dried well.	Not violet colour developed.
7.	<b>Test for type of compound:</b>  2ml of the extract is treated with 2ml of ferric chloride solution.	Red colour developed.



# SPECTROSCOPIC ANALYSIS

## **4.4. SPECTROSCOPIC ANALYSIS**

### **1. ATOMIC ABSORPTION SPECTROMETER (AAS):**

Mandura Chenthooram was analyzed in the presence of heavy metals by using ATOMIC ABSORPTION SPECTROMETER (AAS). This study was done at Asthagiri Herbal Research Foundation, 162-A, Perungudi Industrial Estate, Perungudi, Chennai-96.

#### **INSTRUMENT DETAILS:**

UV-Vis spectrometer AA240 series, UV 8500 Absorption Spectrometer (AAS) was used for the analysis. The operating parameters:

Instrument technique : UV Method

Wavelength (Iron) : 248.3nm

The hollow cathode lamp for Fe was used as a light source to provide wavelength for the elements to be determined.

## **2. INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY (ICP-OES):**

The analysis of heavy metals and trace elements were estimated by using Inductively Coupled Plasma Optical Emission Spectrometry (ICP- OES). The Experimental Procedure was done at SAIF, IIT Madras, Chennai-36.

### **INTRODUCTION:**

Inductively coupled plasma optical emission spectrometry (ICP-OES), is an analytical technique used for the detection of trace metals. It is a type of emission spectroscopy that uses the inductively coupled plasma to produce excited atoms and ions that emit electromagnetic radiation at wavelength characteristic of a particular element. The intensity of this emission is inductive of the concentration of the element within the sample.

### **PRINCIPLE:**

A Perkin-Elmer Optima ICP spectrometer is used for routine ICP-OES analysis. First, a high-energy radio frequency field is impinged upon a stream of argon gas. Then, a spark is used to ionize the argon gas, which forms sustained plasma due to inductive coupling with the high energy radio frequency field and the continuous supply of fresh argon to the plasma torch. This plasma has solutions passed into it in the form of a fine aerosol. The aerosol is dried, the dried particles broken apart, and the individual elements are excited by interaction with the excited state argon in the plasma. As each atom returns to its ground state from the excited state, they emit light at wavelengths characteristic of the elements from which they originate. The emission intensity for each element is monitored for versus element concentration can be constructed.

### **EXTRACTION OF INFORMATION:**

Obtaining qualitative information, i.e., what elements are present in the sample, involves identifying the presence of emission at the wavelengths characteristic of the elements of interest. Obtaining quantitative information, i.e., how much of an element is in the sample, can be accomplished using plots of emission intensity versus concentration called curves.

Perkin-Elmer Optima	5300DV
Rf frequency	40 M Hz
Range	165-782 nm
Detection limit	Upto ppm level using SCD detector

### 3. X-RAY POWDER DIFFRACTION (XRD):



X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions. The analysed material is finely ground, homogenized, and average bulk composition is determined.

Crystalline substances act as three-dimensional diffraction gratings for X-ray wavelengths similar to the spacing of planes in a crystal lattice. X-ray diffraction is now a common technique for the study of crystal structures and atomic spacing. X-ray diffraction is based on constructive interference of monochromatic X-rays and a crystalline sample. These X-rays are generated by a cathode ray tube, filtered to produce monochromatic radiation, collimated to concentrate, and directed toward the sample. The interaction of the incident rays with the sample produces constructive interference (and a diffracted ray) when conditions satisfy Bragg's Law ( $n\lambda = 2d \sin \theta$ ). This law relates the wavelength of electromagnetic radiation to the diffraction angle and the lattice spacing in a crystalline sample.

These diffracted X-rays are then detected, processed and counted. By scanning the sample through a range of  $2\theta$  angles, all possible diffraction directions of the lattice should be attained due to the random orientation of the powdered material. Conversion of the diffraction peaks to d-spacing allows identification of the mineral because each mineral has a set of unique d-spacings. Typically, this is achieved by comparison of d-spacing with standard reference patterns.

All diffraction methods are based on the generation of X-rays in an X-ray tube. These X-rays are directed at the sample, and the diffracted rays are collected. A key component of all diffraction is the angle between the incident and diffracted rays. Powder and single crystal diffraction vary in instrumentation beyond this.

#### 4. SCANNED ELECTRON MICROSCOPY:



VEGA3 is a versatile system intended for both low and high vacuum operations providing users with the advantages of the latest technology, such as new improved high-performance electronics for faster image acquisition, an **ultra-fast scanning system** with compensation for static and dynamic image aberrations or scripting for user-defined applications. In addition, by means of powerful turbo-molecular and rotary vacuum pumps, optimum operating vacuum is reached within few minutes. VEGA3 microscopes can be configured in 4 different chamber sizes: SB, LM, XM, and GM. These chambers are fitted with a variety of ports and designed with optimal geometry for **EDX**, **WDX** and **EBSD** analysis. VEGA3 is an excellent choice for those looking for a reliable and fully functional entry-level SEM system maintaining the best price-to-performance ratio.

Equipment: specimen mounted on a 12.5mm stub with carbon tape and coated with conductive material (sputtered Au for example), stub tweezers. Using the Using the Electron Beam panel select an accelerating voltage (there are four factory presets (5kV, 10kV, 20kV, 30kV, image below). This will turn on the high voltage and begin heating the tungsten filament.

# TOXICOLOGICAL EVALUATION



#### **4.5. TOXICOLOGICAL EVALUATION OF MANDURA CHENTHOORAM (MC):**

The following invivo toxicity studies were carried out on Mandura Chenthooram (MC) by using Organization for Economic Co-operation and Development (OECD) guidelines.

1. Acute Oral Toxicity study (OECD guideline – 423)<sup>43</sup>
2. Repeated Dose 28-days oral toxicity study (OECD guideline-407)<sup>44</sup>

The toxicity studies were carried out at National Institute of Siddha. The study was done after getting permission from the Institutional Animal Ethical Committee. (IAEC Approved No: NIS/IAEC-II/09.2016)

#### **DESCRIPTION OF THE METHOD**

##### **Selection of the animals:**

Animal were selected as per guidelines. The Wistar Albino Rats of weighing 150-200g were obtained from authorized animal breeders of the animal laboratory in TANUVAS, Madhavaram, Chennai and stocked in the animal house at National Institute of Siddha, Chennai. Healthy adult animals of Wistar albino rat, female in sex used for acute oral toxicity study. Healthy adult animals of Wistar albino rat, both sexes were used for Repeated Dose 28-day oral toxicity study. The female animals used in the studies were nulliparous and non-pregnant.

##### **Housing and feeding conditions:**

The temberature in the experimental animal room: 22<sup>0</sup>C(±3<sup>0</sup>C).

Humidity: 60 ± 10%

Lighting: Artificial, the sequence being 12 hours light, 12 hours dark.

The animals were housed in polypropylene cages provided with bedding of husk.

The animals had free access to RO water.

For feeding, standard pellet diet.

**Preparation of animals:**

The animals were randomly selected, to permit individual identification by cage number and individual marking on the fur of each animal with picric acid. The animals were kept in their cages for 7 days prior to dosing to allow for acclimatization to the laboratory conditions. The principles of laboratory animal care were followed.

**Test Substance:**

Mandura Chenthooram, is dark red in colour, without taste and odour.

**Route of administration:**

Oral route was selected, because it is the normal route of clinical administration.

**Acute oral toxicity-experiment procedure:**

All the animals were fasted prior to dosing. Following the period of fasting, the animals were weighed and then the test substance was administered. The control group received an equal amount of distilled water with honey. After the substance has been administered, food was withheld for a further 3-4 hours. The principle of laboratory animal care was followed. Observations were made and recorded systematically and continuously observed as per the guideline after substance administration. An oral dose of 300mg/kg.b.wt, 2000mg/kg.b.wt was administered step by step according to the guidelines (OECD Guideline). The general behaviours of the rat were continuously monitored for ½hr, 1hr, 2hr and 4hr after dosing, periodically during the first 24 hr with special attention given during the first 4 hours and then daily thereafter, for a total of 14 days. Changes in the normal psychomotor activity and external morphology and their body weights were monitored periodically before and the time at which signs of toxicity or mortality were recorded.

**Test animals:**

Species and strain	: Wistar Albino rat
Sex	: Female
Age, Weight	: 8-12 weeks, 150-200gm

Test guideline	: OECD guideline-423
Groups/treatment	: Grouped by randomization
During of exposure	
to the “ <b>Mandura Chenthooram</b> ”	: single dose-one day
Study duration	: 14 days –observation
Number of animals	: 3 females/group
Route of administration	: Oral

#### **Number of animals and dose levels:**

Animals were divided into 3 groups, each group containing 3 female rats. One group as control and the other 2 groups II and III were treated with test drug **Mandura Chenthooram** at two different doses 300mg/kg.b.wt, 2000mg/kg.b.wt respectively.

#### **Grouping of animals in Acute Oral Toxicity study:**

<b>Groups</b>	<b>No of Rat</b>
Control: Vehicle control (Distilled Water with Honey)	3 female
Group II: Test drug <b>Mandura Chenthooram</b> (300mg/kg.b.wt)	3 female
Group III: Test drug <b>Mandura Chenthooram</b> (2000mg/kg.b.wt)	3 female

#### **Observations:**

- Moratality, behavioural changes,
- ½hr, 1hr, 2hr, 4hr and upto 24 hour observation,
- All rats will be observed twice daily on week days for 2 weeks,
- Body weight will be monitored weekly once,
- Feed and water intake will be calculated per day,

**Cage-side observation:**

Clinical observation includes abnormal Gait (rolling and tiptoe), aggressiveness, akinesia, analgesia, catalepsy, convulsions, defecation, excitation, exophthalmos, head twitches, lacrimation, lethality, loss of corneal reflex, loss of righting reflex, loss of traction, piloerection, ptosis, reactivity to touch, respiration, salivation, scratching, sedation, stereotypies (chewing), stereotypies (head movements), stereotypies (sniffing), straub, tremor and writhes.

**Gross necropsy:**

At the end of the 14<sup>th</sup> day observation, all the animals were sacrificed by using Thiopentone Sodium gross necropsy includes examinations of the external surface of the body, all orifices, cranial, thoracic and abdominal cavities and their contents Brain, eye, heart, lungs, stomach, spleen, liver, kidneys, adrenals, uterus.

**REPEATED DOSE 28 DAYS ORAL TOXICITY STUDY****Test animals:**

Species and strain	: Wistar Albino rats
Sex	: Male and Female
Age, Weight	: 6-8 weeks, 180-220gm
Test guideline	: OECD guideline-407
Groups/treatment	: Grouped by randomization
Study duration	: 28 days
Number of grouping	: 4 groups
Number of animals	: 3males, 3females/group
Route of administration	: Oral

### Justification of dose selection:

As stated results of acute toxicity studies in wistar albino rat indicated that Mandura Chenthooram was not toxic up to the dose of 2000mg/kg.b.wt LD50. The oral route was selected for use because oral route is considered to be a proposed therapeutic route. The low dose was calculated from the therapeutic dose (130mg) and body surface area of the rat (0.018). Calculation of low dose –  $130 \times 0.018 = 2.34/200\text{gm}$  of animal.

### Grouping of animals:

Repeated dose 28 days oral toxicity study was carried out at different dose levels. The animals in both sexes were divided in four groups (Group I, II, III & IV). Each group consist of 3 animals (3 males and 3 females). Group – I served as control and the other three groups (II, III & IV) were treated as test group Low dose – 2.34mg/kg.b.wt), Mid dose – 11.7mg/kg.b.wt), High dose – 23.4mg/kg.b.wt), respectively

### Grouping of animals in Repeated dose 28 days oral Toxicity study

Groups	No of Rats
GroupI: Vehicle control( <b>Distilled water with honey</b> )	6 (3male, 3female)
GroupII:Test drug( <b>MC*</b> )Low dose(2.34mg/kg.b.wt)	6 (3male, 3female)
GroupIII:Test drug( <b>MC*</b> )Mid dose11.7mg/kg.b.wt)	6 (3male, 3female)
Grou IV: Test drug( <b>MC*</b> )High dose 23.4mg/kg.b.wt)	6 (3male, 3female)

**\*MC- Mandura Chenthooram**

### Administration of doses:

The animals were dosed with the drug daily for a period of 28 days. The test drug administered by oral gavage, and this was done in a single dose to the animals once in daily for 28 days.

**Observations:**

- Moratlity, behavioural changes,
- All rats will be observed twice daily on week days for 28 days,
- Body weight will be monitored weekly once,
- Feed and water intake will be calculated per day,

**Cage-side observation**

Clinical observation includes abnormal Gait (rolling and tiptoe), aggressiveness, akinesia, analgesia, catalepsy, convulsions, defecation, excitation, exophthalmos, head twitches, lacrimation, lethality, loss of corneal reflex, loss of righting reflex, loss of traction, piloerection, ptosis, reactivity to touch, respiration, salivation, scratching, sedation, stereotypies (chewing), stereotypies (head movements), stereotypies (sniffing), straub, tremor and writhes.

**Blood collection and laboratory investigations:**

At the end of 28 days, blood samples were collected just prior to euthanasia in all overnight (12 hours) fasted rats from abdominal aorta using sodium heparin containing vacutainer (200IU/ml) for Blood chemistry and potassium EDTA containing vacutainer (1.5mg/ml) for Haematology sample.

- Complete Blood Count
- Renal function test
- Liver function test
- Lipid profile

**Necropsy:**

By the end of 28 days, after blood collection, the animals were sacrificed by excessive anaesthesia. Animals were subjected to gross necropsy. Organs like heart, lung, kidney, liver, spleen, stomach, brain and sex organs were collected from all animals and preserved in 10% buffered neutral formation.

**Histopathology:**

Control and highest dose groups animals will be initially subjected to histopathological investigation. If any abnormality found in the highest dose group then the low and mid dose group will also be examined. Various organs (brain, heart, lungs, liver, kidney, spleen, stomach, bone) will be collected from all the animals and preserved in 10% buffered neutral formalin, sliced , 5 or 6µm sections and will be stained with Hematoxylin and Eosin. Examined for histopathological changes.

**Statistical Analysis:**

Findings such as clinical signs of intoxication, body weight changes, food consumption, hematology, and biochemical parameters were subjected to one-way ANOVA followed by Dunnet “t” test using a computer software programme Graph Pad Instat-3.

# *RESULTS*

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## 5.1. QUALITATIVE ANALYSIS

**Table 1: Colour, nature of –Mandura Chenthooram:**

S.No	Parameters	Results	Method of Testing
1	Colour	Dark red	By visual
2	Odour	Odourless	Olfactory examination
3	Solubility	i) Soluble in distilled water & honey ii) Sparingly soluble in distilled water	Qualitative
4	Nature	Powder	By visual

From Table 1: The organoleptic characters show that Mandura Chenthooram is dark in colour and odourless powder form of drug. It is easily soluble in distilled water with honey and sparingly soluble in distilled water.

**Table 2: Physicochemical analysis of - Mandura Chenthooram:**

S.No	Parameters	Percentage
1	Loss on drying	Less than 1%
2	Total ash value	99.67%
3	Acid insoluble ash	94.99%
4	Water soluble ash	Less than 1%
5	Water soluble extraction	0.68%
6	Alcohol soluble extraction	2.1%
7	pH Value	8.02

From Table 2 : The Physico- chemical analysis of Mandura Chenthooram explained in the parameters such as Moisture content, Total ash value, Acid insoluble ash, Water soluble ash, Water soluble extraction, Alcohol soluble extraction are within the normal limit. pH of the drug was 8.02, denotes it is alkaline.

**Table 3: Biochemical analysis of Mandura Chenthooram (MC):**

<b>S.No</b>	<b>PROCEDURES</b>	<b>RESULTS</b>
<b>1</b>	<b>Test for Ammonium</b>	<b>-</b>
<b>2</b>	<b>Test for Sodium</b>	<b>-</b>
<b>3</b>	<b>Test for Magnesium</b>	<b>-</b>
<b>4</b>	<b>Test for Aluminium</b>	<b>-</b>
<b>5</b>	<b>Test for Pottasium</b>	<b>-</b>
<b>6</b>	<b>Test for Calcium</b>	<b>+</b>
<b>7</b>	<b>Test for Ferrous Iron</b>	<b>+</b>
<b>8</b>	<b>Test for Zing</b>	<b>-</b>
<b>9</b>	<b>Test for Arsenic</b>	<b>-</b>
<b>10</b>	<b>Test for Mercury</b>	<b>-</b>
<b>11</b>	<b>Test for Lead</b>	<b>-</b>
<b>12</b>	<b>Test for Sulphate</b>	<b>+</b>
<b>13</b>	<b>Test for Chloride</b>	<b>-</b>
<b>14</b>	<b>Test for Phosphate</b>	<b>-</b>
<b>15</b>	<b>Test for Carbonate</b>	<b>+</b>
<b>16</b>	<b>Test for Fluoride &amp; Oxalate</b>	<b>-</b>
<b>17</b>	<b>Test for Starch</b>	<b>+</b>
<b>18</b>	<b>Test for Reducing sugar</b>	<b>-</b>
<b>19</b>	<b>Test for Alkaloids</b>	<b>+</b>
<b>20</b>	<b>Test for Amino Acids</b>	<b>+</b>
<b>21</b>	<b>Test for Unsaturated compounds</b>	<b>-</b>
<b>22</b>	<b>Test for type of compound</b>	<b>+</b>

(+)- Present; (-) – Absent

## 5.2. SPECTROSCOPIC ANALYSIS:

### 1. ATOMIC ABSORPTION SPECTROSCOPY:

Heavy metals content of Mandura Chenthooram was analyzed by AAS this results Tabulated in Table 4.

**Table-4: Analysis of Heavy Metals:**

S.No	Name of the element	Results
1	Iron ( Fe)	22.60%.

From Table 4: The Atomic Absorption Spectroscopy result shows that the heavy metal iron present in Mandura Chenthooram were found to be, at the same time the Iron content of test drug is 22.60%.

## 2. INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY (ICP-OES):

Weight of test drug: **0.51740g**

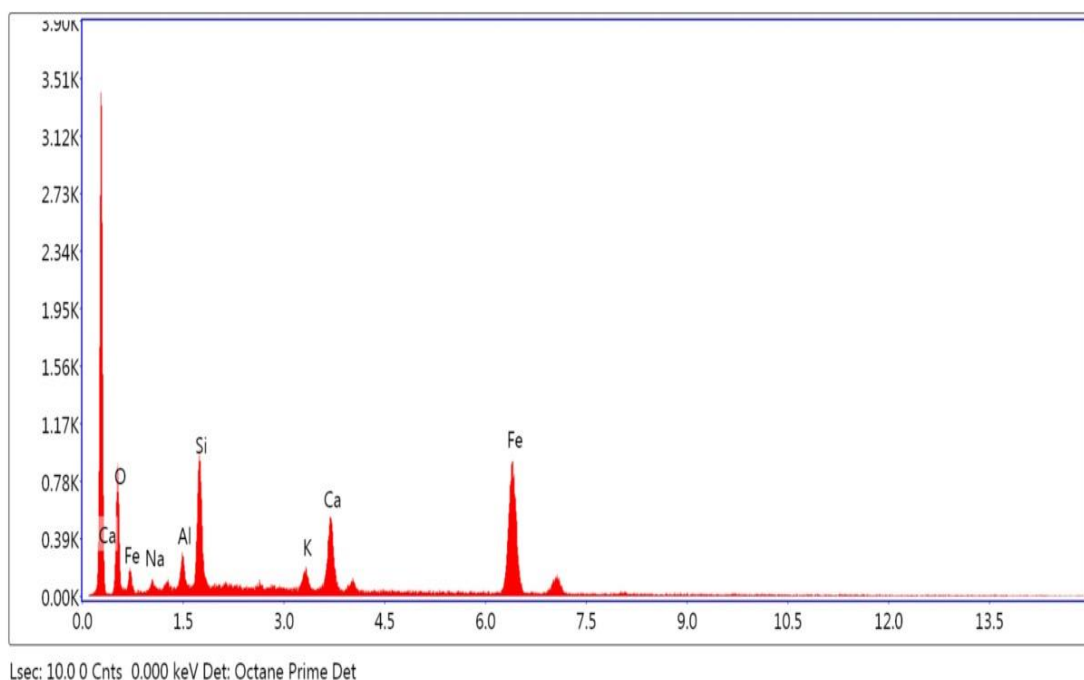
**Table 5: Results of Quantitative analysis by ICP-OES for Mandura Chenthooram:**

S.No	Elements	Wave Length In (nm)	Results(In Mg/L)
1	Aluminium	Al 396.152	BDL
2	Arsenic	As 188.979	BDL
3	Calcium	Ca 315.807	03.550mg/L
4	Cadmium	Cd 228.802	BDL
5	Copper	Cu 327.393	BDL
6	Iron	Fe 238.204	201.770 mg/L
7	Mercury	Hg 253.652	BDL
8	Potassium	K 766.491	03.071 mg/L
9	Magnesium	Mg 285.213	01.104 mg/L
10	Sodium	Na 589.592	01.110 mg/L
11	Nickel	Ni 231.604	BDL
12	Lead	Pb 220.353	BDL
13	Phosphorus	P 213. 617	96.307 mg/L
14	Sulphur	S 180.731	01.224 mg/L

**BDL – Below Detection Limit**

### 3. X-RAY DIFFRACTION PATTERN OF MANDURA CHENTHOORAM:

**Figure 1: EDAX analysis of Medicine sample:**



**Table 6: Representing the weight and atomic percentage of elements present in Medicine sample:**

Element	Weight%	Atomic%	Net Int.
OK	41.54	62.18	504.89
NaK	6.53	6.80	82.66
AlK	3.79	3.37	145.58
SiK	13.02	11.10	688.95
KK	1.52	0.93	119.07
CaK	7.22	4.31	519.53
FeK	26.38	11.31	1210.18

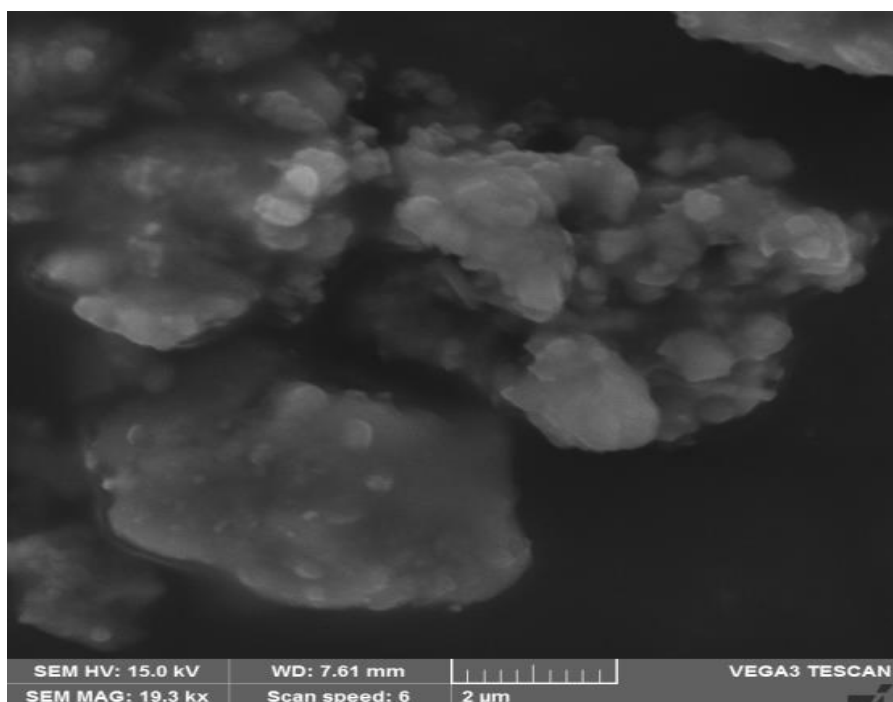
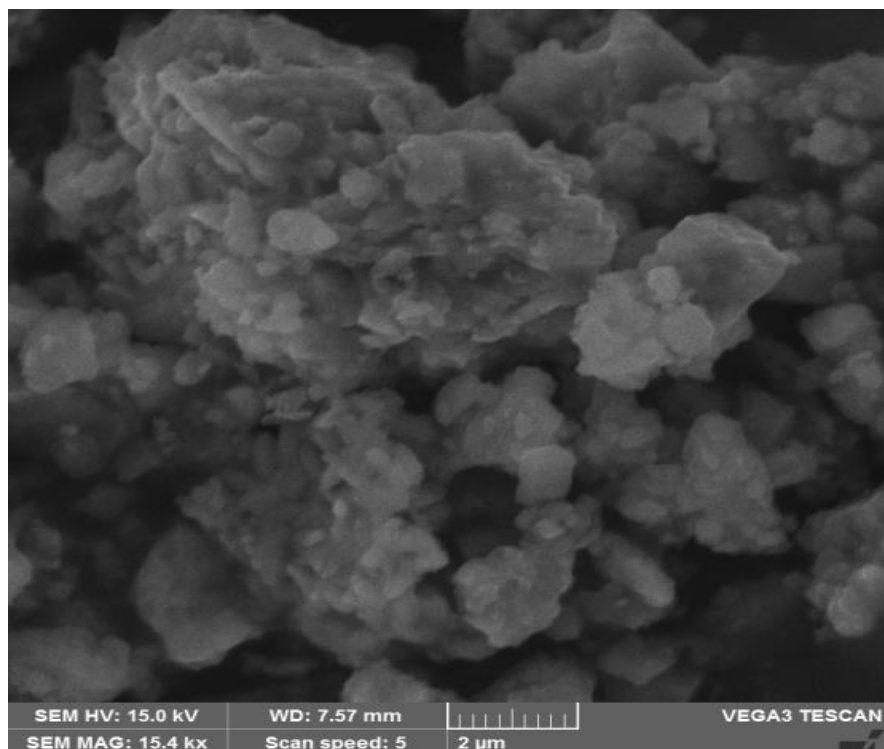
EDAX analysis shows the elements present in the sample as shown in Figure. The table represents the weight and atomic percentage of sample. The presence of iron is 26 Wt% and Oxygen is of 41.5 % during sample preparation sintering takes

place many time in presence of organic compounds of the iron gets more oxidized and the level of oxygen is increased. The presence of Si and Ca is small contributed by the presence of sand during sample collection and the Na and K are from the White Goat milk and Urine. Since the sample is subjected to the calcination process it became oxidized.

#### 4. SCANNED ELECTRON MICROSCOPY:

Determination of Particle size of Mandura Chenthooram

**Figure-2: SEM Image of Mandura Chenthooram:**



**Description:**

The VEGA TESCAN 3 instrument is used with tungsten filament to image the samples. The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape as shown in Figure 2. The particles are aggregate and individual particles are seen on the top of the clusters. Since the particles are collected from the raw iron oxide (Rust) the particle size is large.



### 5.3. TOXICICOLOGICAL EVALUATION:

#### TOXICOLOGICAL EVALUATION OF MANDURA CHENTHOORAM (MC):

##### A. ACUTE TOXICITY STUDY:

Acute Toxicity Study was done as per OECD Guideline-423 with dose levels of 300, 2000 mg/kg.b.wt. Throughout the 14 days of observation period.

**Table 7: Dose finding experiment and behavioural Signs of Acute Toxicity Study on rat:**

No	Dose mg/kg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	300	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-
2	2000	+	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-

1.Alertness, 2.Aggressiveness, 3.Pile erection, 4.Grooming, 5.Gripping, 6.Tough response, 7.Decreased Motor Activity, 8.Tremors, 9.Convulsions, 10.Muscle Spasm, 11.Catatonina, 12.Muscle relaxant, 13.Hypnosis, 14.Analgesis, 15. Lacrimation, 16. Exophthalmos, 17.Diarrhoea, 18.Writing, 19.Dyspnoea, 20. Mortality.

+ Presence of Activity

- Absence of Activity

All the data were summarized in the form of (table-7) revealed that there was no abnormal signs and behavioural changes in all animals at the dose level of 300,2000 mg/kg body weight administered orally, during the study period.

There was no mortality observed after dosing of Mandura Chenthooram upto 2000mg/kg body weight during the study period of 14 days. This indicates that the LD50 of Mandura Chenthooram is more than 2000mg/kg b.wt.

There were no changes in skin and fur, eyes and mucous membranes of all animals. The eating, drinking habit, sleep pattern, locomotion were normal in all animals and no changes in body weight as compared to control group.

At the end of the 14<sup>th</sup> day, necropsy was performed and there was no abnormality seen in test groups as compared to control group during the examination.

## B. REPEATED DOSE 28 DAYS ORAL TOXICITY STUDY:

### 1. TABLES AND GRAPHS:

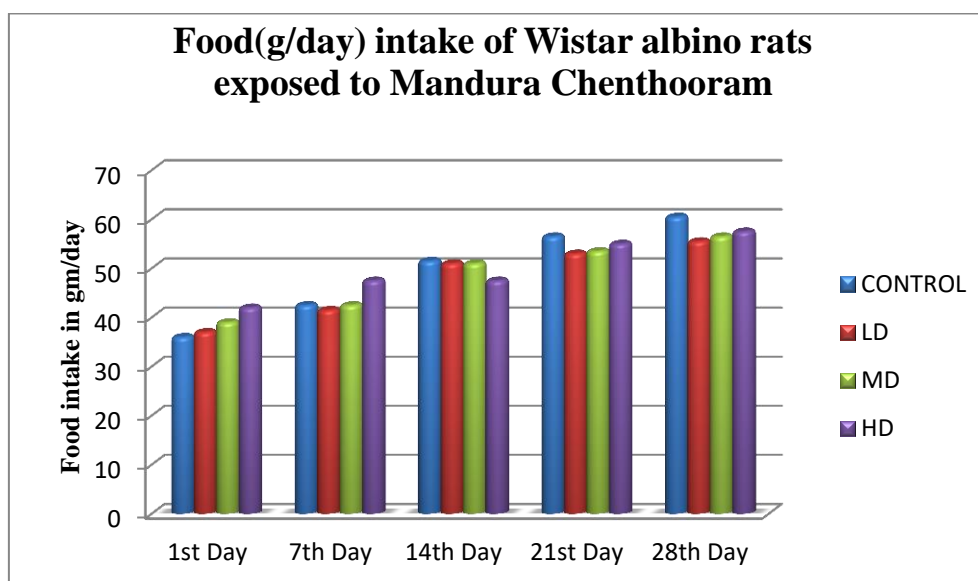
**Table 8: Food (g/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):**

Dose(mg/day)/Day	1 <sup>st</sup> day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day
CONTROL	54±12.72	42.5±3.53	51.5±2.12	56.5±2.12	67.5±6.36
LOW DOSE	35±7.07	41.5±12.02	51±12.72	51±14.14	55.5±16.26
MID DOSE	35.5±6.36	42.5±3.53	43±2.82	46.5±6.36	48.5±6.36
HIGH DOSE	39±1.41	47.5±3.53	47.5±10.60	55±7.07	57±10.60

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 8: Food consumption of the animals no significant difference in food intake the test group animals were observed when compared with control group during the study period.

**Figure 3: Food (g/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):**



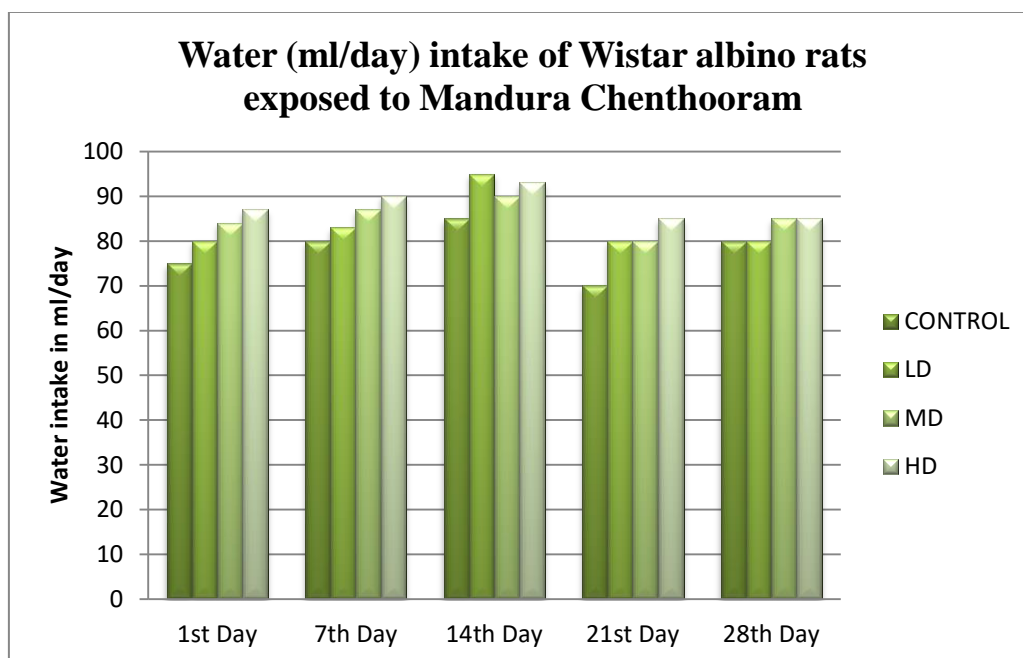
**Table 9: Water (ml/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):**

Dose(mg/kg)	1 <sup>st</sup> day (ml/day)	7 <sup>th</sup> day (ml/day)	14 <sup>th</sup> day (ml/day)	21 <sup>st</sup> day (ml/day)	28 <sup>th</sup> day (ml/day)
<b>CONTROL</b>	<b>75±21.21</b>	<b>80±14.14</b>	<b>85±21.21</b>	<b>70±14.41</b>	<b>80±0</b>
<b>LOW DOSE</b>	<b>80±0</b>	<b>105±7.07</b>	<b>95±21.21</b>	<b>80±14.14</b>	<b>80±0</b>
<b>MID DOSE</b>	<b>80±14.14</b>	<b>80±28.28</b>	<b>75±7.07</b>	<b>80±0</b>	<b>85±7.07</b>
<b>HIGH DOSE</b>	<b>80±28.28</b>	<b>70±28.28</b>	<b>70±14.14</b>	<b>85±35.35</b>	<b>85±7.07</b>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 9: Water consumption the no difference in water intake of control and test group of animals observed during the study period (Table-9).

**Figure 4: Water (ml/day) intake of Wistar albino rats exposed to Mandura Chenthooram (MC):**

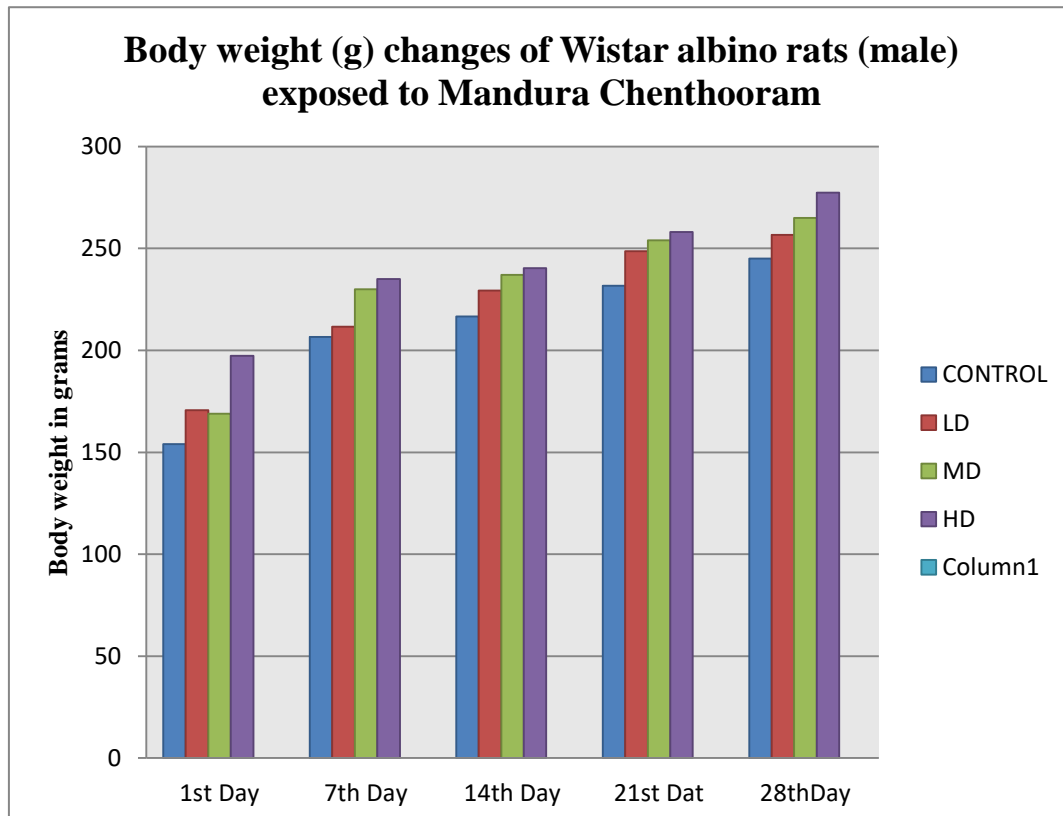


**Table10: Body weight (g) changes of Wistar albino rats (male) exposed to Mandura Chenthooram (MC):**

Dose	1 <sup>st</sup> day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
<b>CONTROL</b>	154±5.24	206.66±14.57	216.66±18.17	231.66±29.29	245±39.88
<b>LOW DOSE</b>	170.66±4.04	211.66±15.27	229.33±5.85	248.66±10.50	266.66±15.24
<b>MID DOSE</b>	169±6.55	235±9.16	248±12.49	261±12.28	273±11.78
<b>HIGH DOSE</b>	197.33±32.88	221.66±36.50	240.33±35.92	252.33±37.07	261.33±35.92

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

**Figure 5: Body weight (g) changes of Wistar albino rats (male) exposed to Mandura Chenthooram (MC):**



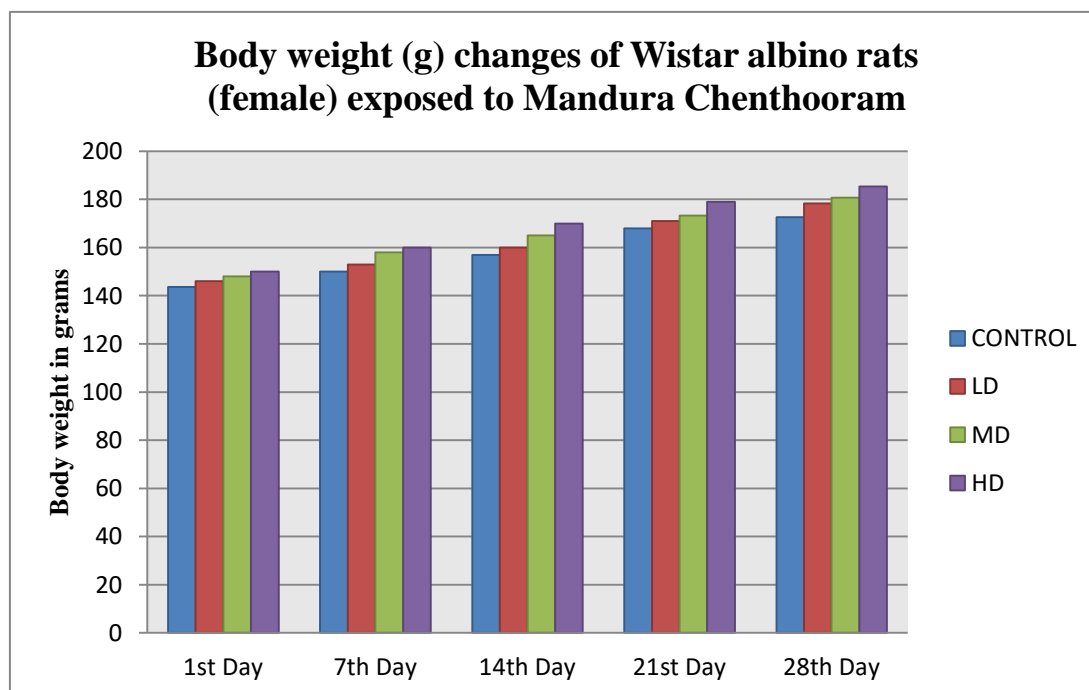
**Table 11: Body weight (g) changes of Wistar albino rats (female) exposed to Mandura Chenthooram (MC):**

Dose (mg/kg)	1 <sup>st</sup> day	7 <sup>th</sup> day	14 <sup>th</sup> day	21 <sup>st</sup> day	28 <sup>th</sup> day
<b>CONTROL</b>	<b>143.66±2.88</b>	<b>150±2.51</b>	<b>157±2.51</b>	<b>168±1.73</b>	<b>172.66±2.08</b>
<b>LOW DOSE</b>	<b>146±6</b>	<b>153±2.88</b>	<b>160±2.64</b>	<b>171±6</b>	<b>178.33±7.63</b>
<b>MID DOSE</b>	<b>148±3.46</b>	<b>158±5.03</b>	<b>165±5.13</b>	<b>173.33±2.51</b>	<b>180.66±1.52</b>
<b>HIGH DOSE</b>	<b>150±9.86</b>	<b>160±16.82</b>	<b>170±16.16</b>	<b>179±19.51</b>	<b>185.33±18.61</b>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 10, 11: Body weight of the both control and test group exhibited normal body weight throughout the study period.

**Figure 6: Body weight (g) changes of Wistar albino rats (female) exposed to Mandura Chenthooram (MC):**



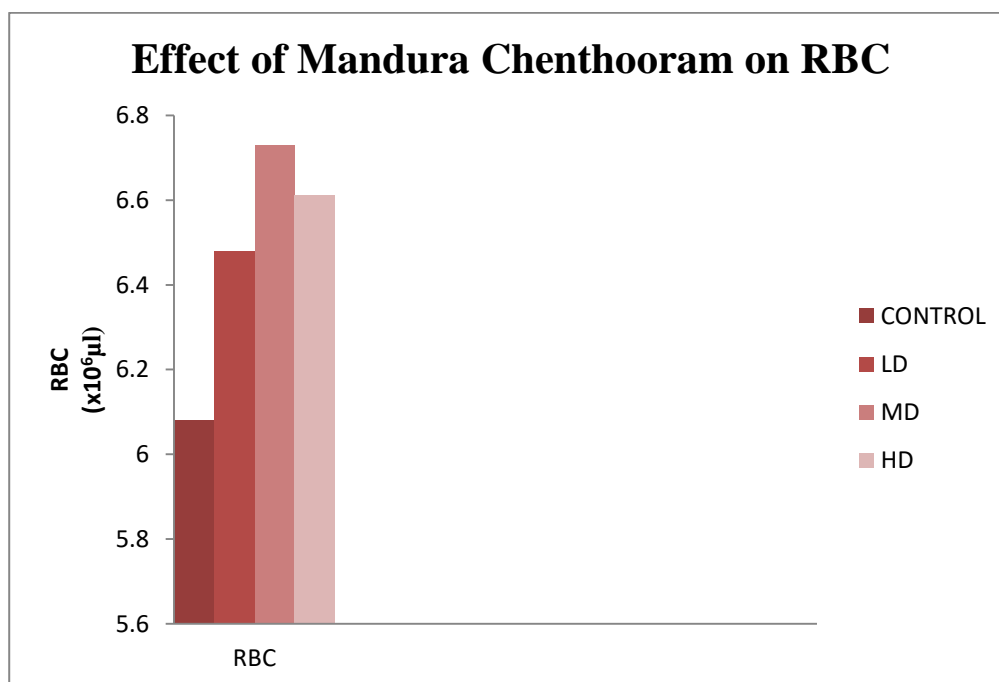
**Table 12: Effect of Mandura Chenthooram on Hematological Parameters:**

Parameters	Control	Low Dose	Mid Dose	High Dose
RBC (X 10 <sup>6</sup> µl)	6.08±0.81	6.48±1.75	6.73±0.87	6.61±0.91
WBC(X10 <sup>3</sup> µl)	9.06±1.79	9±1.82	8.75±1.86	8.76±0.94
PLT(X10 <sup>3</sup> µl)	668.66±131.49	765±132.74	790.66±117.92	715.16±134.51
HGB(g/dl)	13.1±2.24	12.08±1.51	12.45±1.04	13.11±1.19
MCH(pg)	16.81±2.37	17.85±1.92	18.33±1.71	19±2.31
MCV(fl)	60.36±6.12	60.41±5.87	60.98±2.72	57.18±5.19
NEUTROPHILS (10 <sup>3</sup> /mm <sup>3</sup> )	1.71±0.44	1.75±0.61	1.53±0.46	1.7±0.60
EOSINOPHILS(%)	1.46±0.18	1.5±0.17	1.53±0.26	1.31±0.29
BASOPHILS(%)	0.16±0.40	0.33±0.51	0.16±0.40	1.31±0.29
LYMPH(%)	71.45±11.29	75.61±12.50	74.25±9.39	70.68±6.47
MON(%)	2.51±0.67	2.7±0.76	2.68±0.58	1.86±1.04

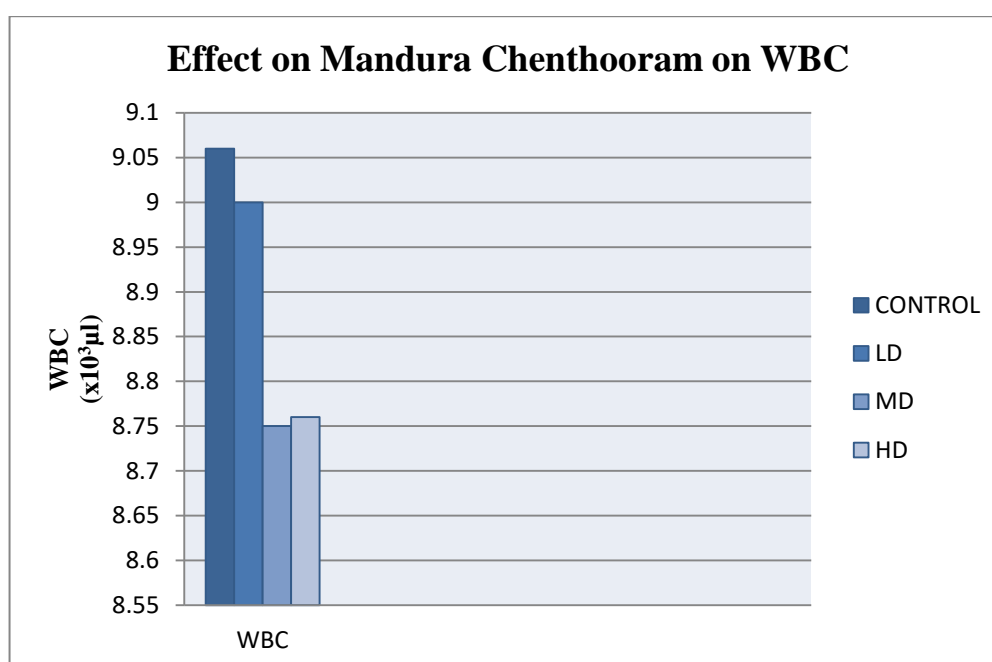
Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 12: The results of the Haematological investigations conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.

**Figure 7: Effect of Mandura Chenthooram on RBC:**

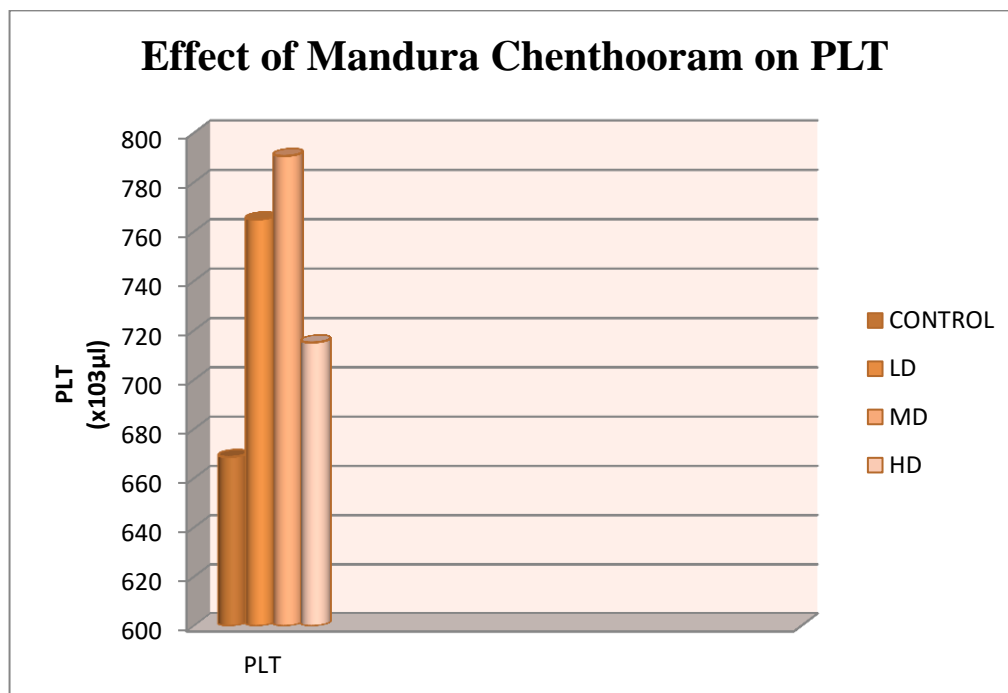


**Figure 8: Effect of Mandura Chenthooram on WBC:**

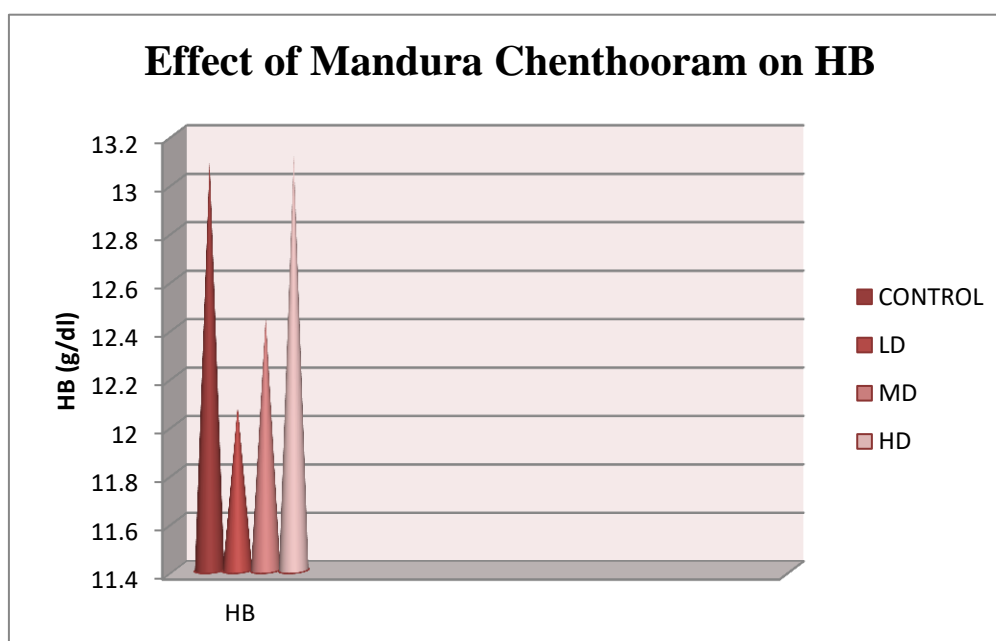




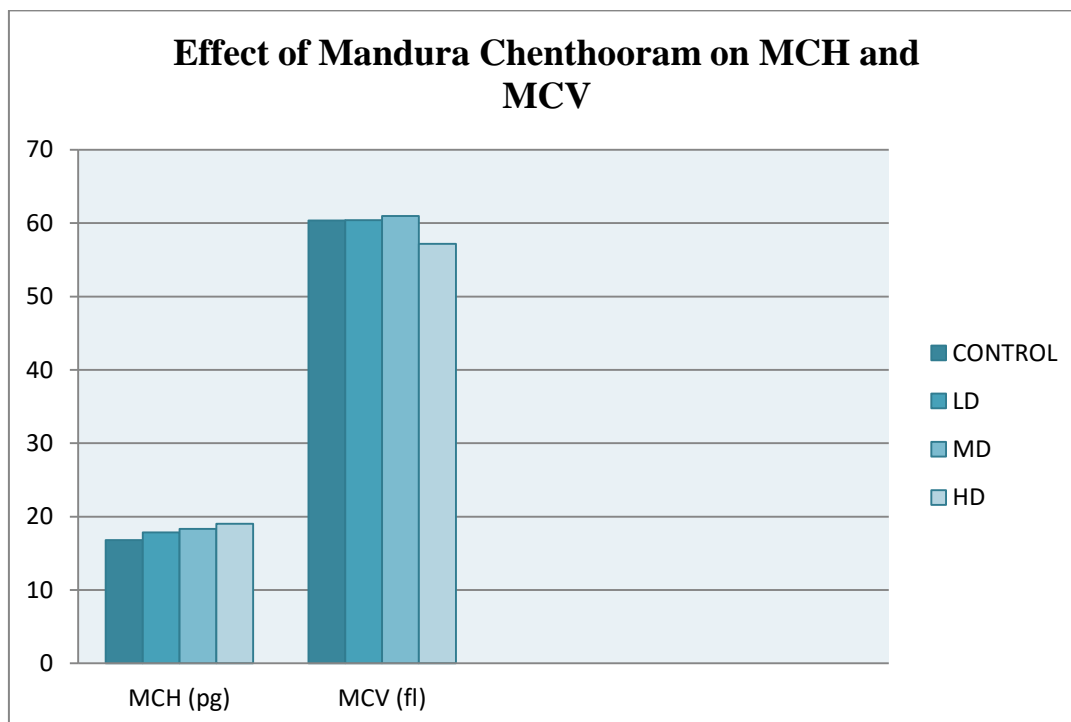
**Figure 9: Effect of Mandura Chenthooram on PLT:**



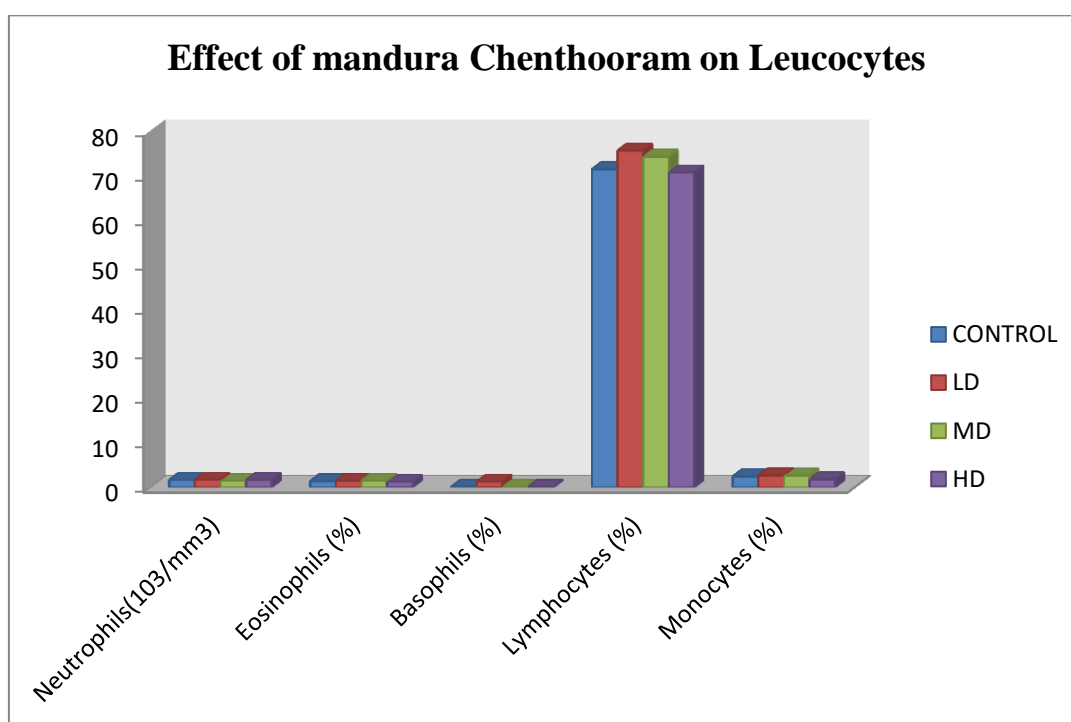
**Figure 10: Effect of Mandura Chenthooram on Haemoglobin**



**Figure 11: Effect of Mandura Chenthooram on MCH and MCV:**



**Figure 12: Effect of Mandura Chenthooram on Leucocytes:**



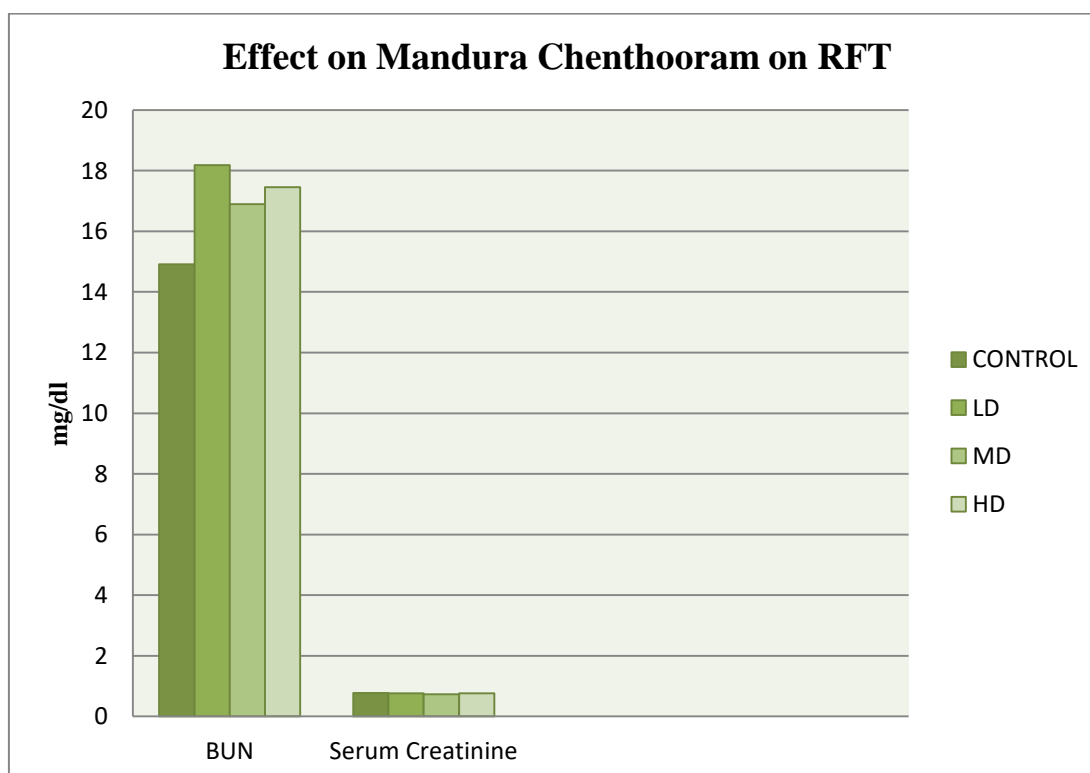
**Table 13: Effect of Mandura chenthooram on Biochemical Parameters - Renal function test:**

Parameters	Control	Low Dose	Mid Dose	High Dose
<b>BUN (mg/dl)</b>	<b>14.91±4.93</b>	<b>18.18±3.48</b>	<b>16.9±2.30</b>	<b>17.45±3.14</b>
<b>Serum Creatinine(mg/dl)</b>	<b>0.78±0.19</b>	<b>0.76±0.13</b>	<b>0.73±0.24</b>	<b>0.76±0.18</b>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 13: The results of the Renal function test conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.

**Figure 13: Effect of Mandura chenthooram on Biochemical Parameters - Renal function test:**



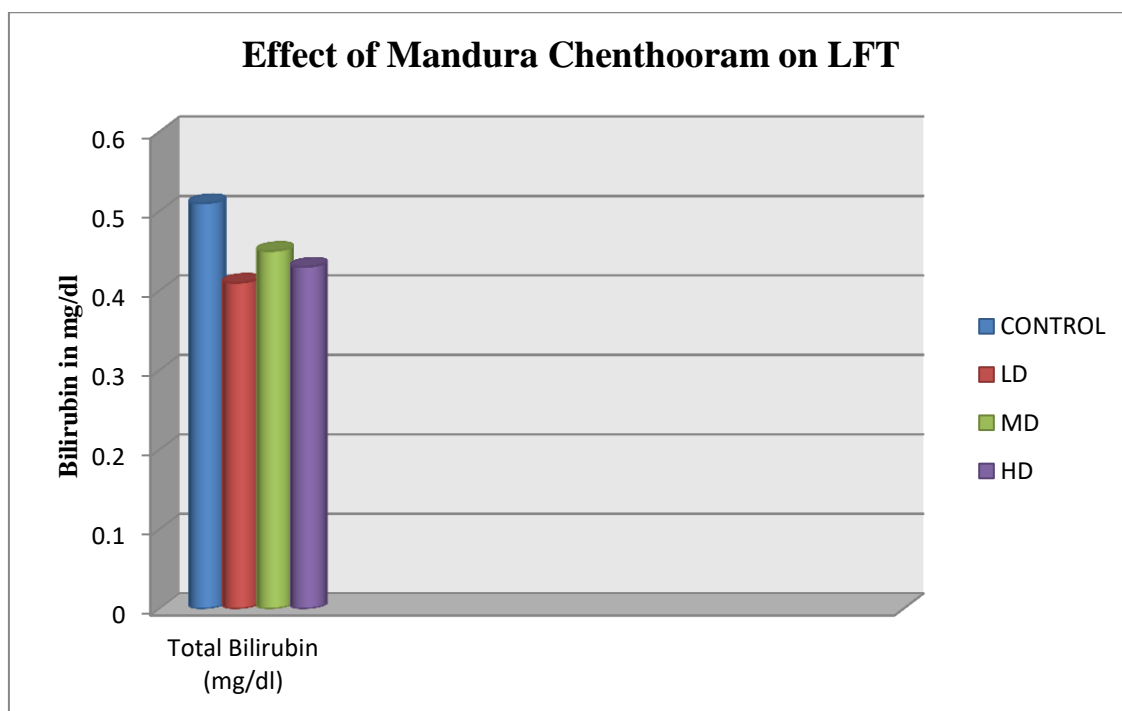
**Table 14: Effect of Mandura chenthooram on Biochemical Parameters - Liver function test:**

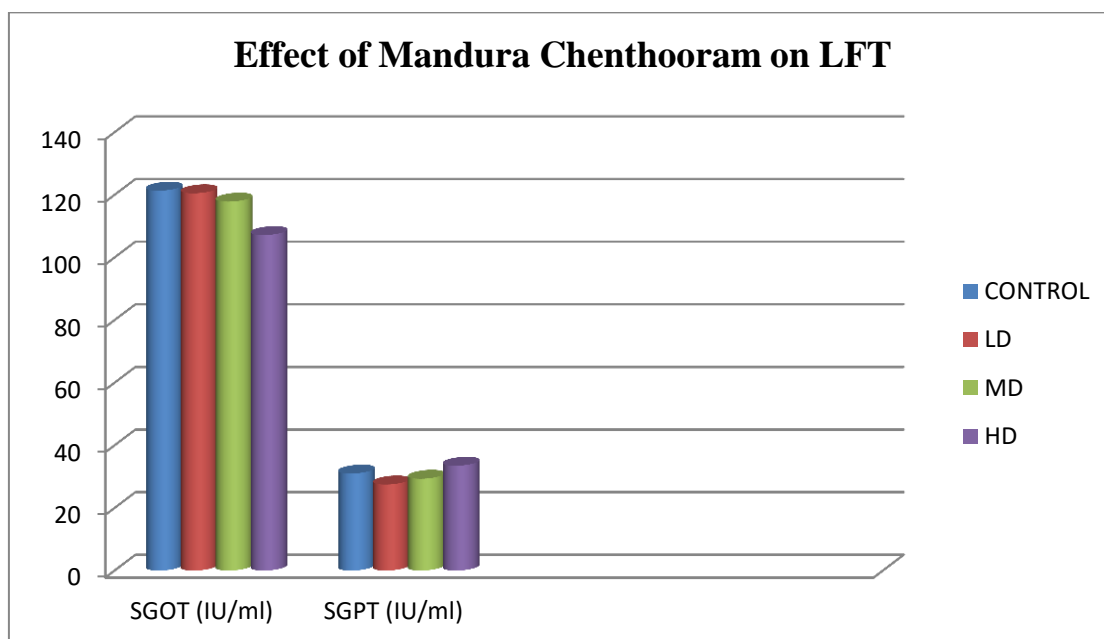
Parameters	Control	Low Dose	Mid Dose	High Dose
<b>Total Bilirubin(mg/dl)</b>	<b>0.51±0.14</b>	<b>0.41±0.21</b>	<b>0.45±0.08</b>	<b>0.43±0.12</b>
<b>SGOT(IU/ml)</b>	<b>121.33±16.08</b>	<b>120.5±27.14</b>	<b>117.83±21.60</b>	<b>107.16±34.38</b>
<b>SGPT(IU/ml)</b>	<b>31±10.29</b>	<b>27.5±5.54</b>	<b>29.33±3.72</b>	<b>33.5±8.16</b>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 14: The results of the Liver function test conducted at the end of the study, the test groups revealed no significant changes in levels of haematological parameters, when compared with control group.

**Figure 14: Effect of Mandura chenthooram on Biochemical Parameters - Liver function test**





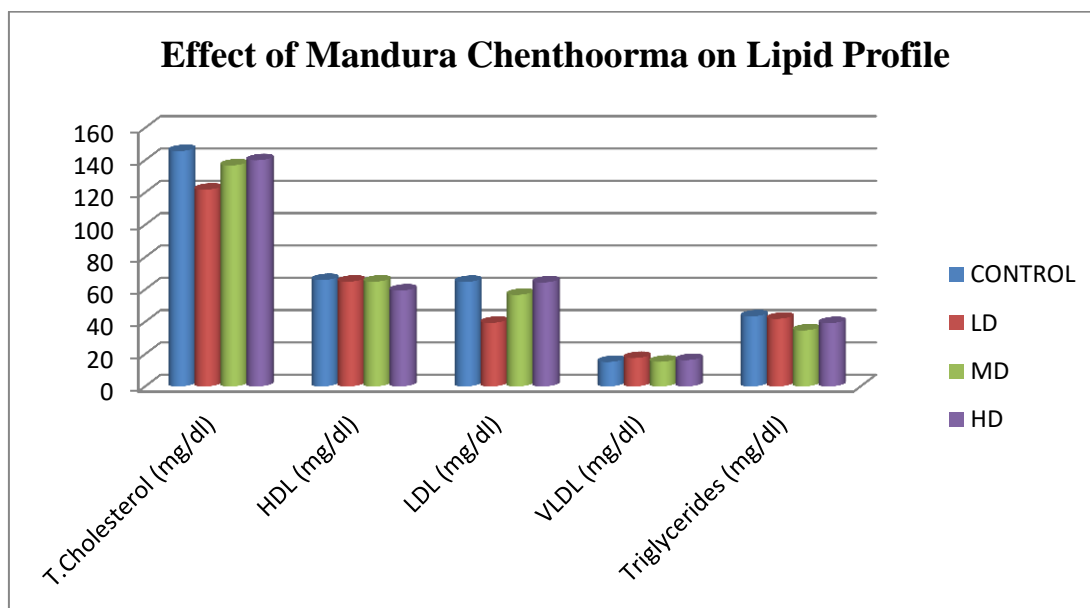
**Table 15: Effect of Mandura chenthooram on Biochemical Parameters - Lipid Profile**

Parameters	Control	Low Dose	Mid Dose	High Dose
<b>Total Cholesterol(mg/dl)</b>	<b>145.63±23.28</b>	<b>121.75±19.91</b>	<b>136.76±13.79</b>	<b>139.96±8.64</b>
<b>HDL(mg/dl)</b>	<b>65.83±12.36</b>	<b>64.83±11.54</b>	<b>64.83±13.94</b>	<b>59.33±11.70</b>
<b>LDL(mg/dl)</b>	<b>64.66±20.06</b>	<b>39.33±15.78</b>	<b>56.66±12.51</b>	<b>64.33±17.96</b>
<b>VLDL(mg/dl)</b>	<b>15.13±1.81</b>	<b>17.58±3.57</b>	<b>15.26±4.60</b>	<b>16.3±3.12</b>
<b>TGL(mg/dl)</b>	<b>43.33±12.50</b>	<b>41.83±10.00</b>	<b>34.66±8.61</b>	<b>39.16±4.99</b>

Values were expressed as mean± S.D. for N=6 rats in each group one-way ANOVA followed by Dunnett's test. Significant indicates that \*P<0.05, \*\*P<0.01

From Table 15: Biochemical investigations were conducted at the end of the study and the results were recorded. In test groups there was no significant change present in biochemical parameters, when compared with the control group. At the values were normal biological limits.

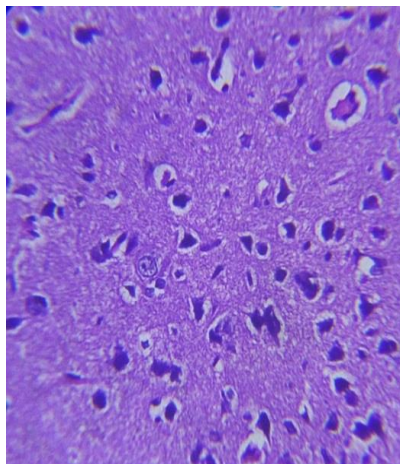
**Figure 15: Effect of Mandura chenthooram on Biochemical Parameters - Lipid Profile:**



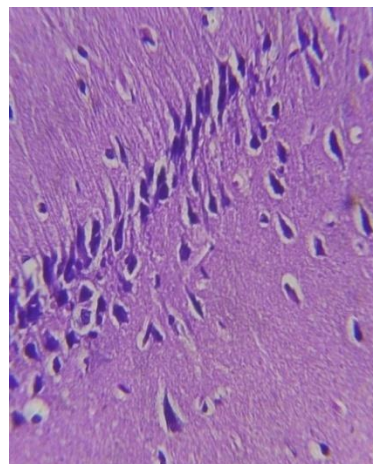
## Histopathology of Brain

### High Power Magnification 40X

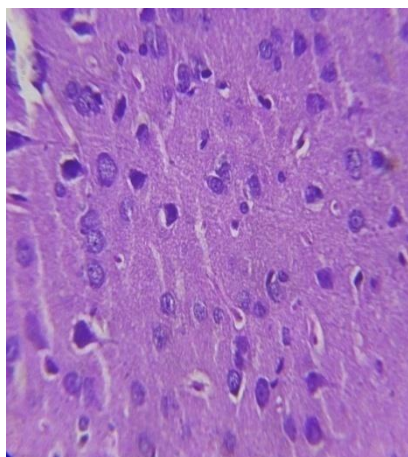
**PLATE: A CONTROL (M)**



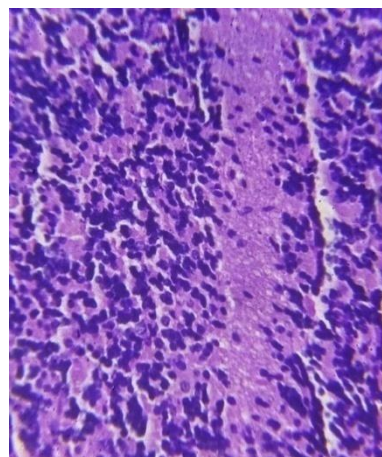
**PLATE: A CONTROL (M)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A** -The cerebral sections showed normal architecture in both cortex and medulla.

**PLATE: B** -Appearance of Hippocampal neurons was normal with dense network.

-Morphology of neurons in CA1, CA2 and CA3 zones are normal.

**PLATE: C** -Arrangement of neurons on cerebral cortex appears normal and dense.

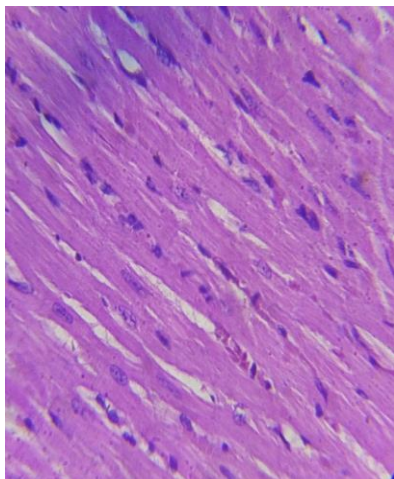
-No signs of ischemia or lesion were observed.

**PLATE: D** -Normal architecture was observed in both cortex and medulla of cerebellum.

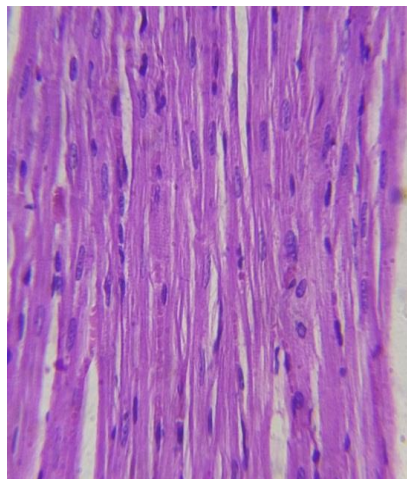
## Histopathology of Heart

### High Power Magnification 40X

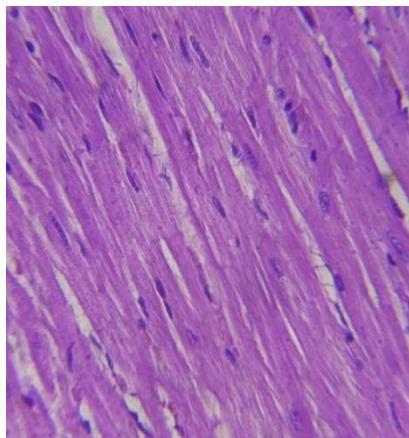
**PLAET: A CONTROL (M)**



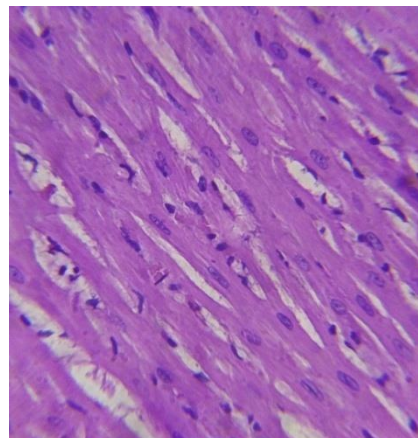
**PLATE: B CONTROL (FM)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A-**Appearance of myocyte was normal.

**PLATE: B -**Appearance of fibrils and cross striations are normal and equidistant.

**PLATE: C-** Nucleus appears prominent with regular arrangement of fibres.

-No evidence of pyknotic nucleus.

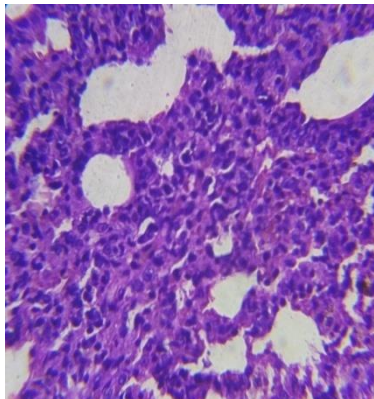
**PLATE: D-** Myocardial cells appears normal with well-defined mycoplasma and prominent nucleus and nucleolus.



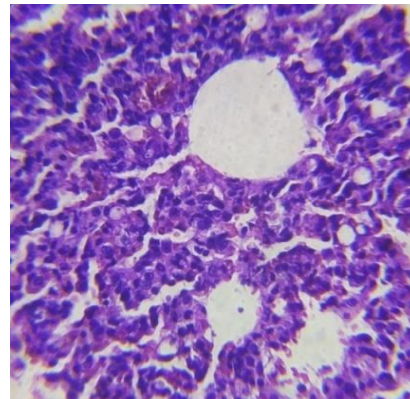
## **Histopathology of Lung**

### **High Power Magnification 40X**

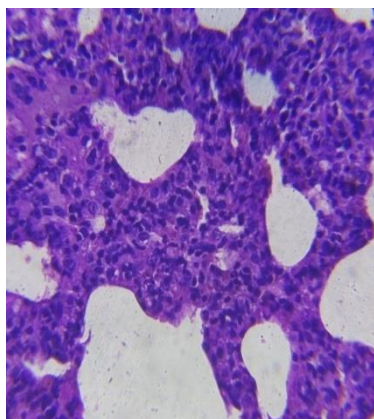
**PLATE: A CONTROL (M)**



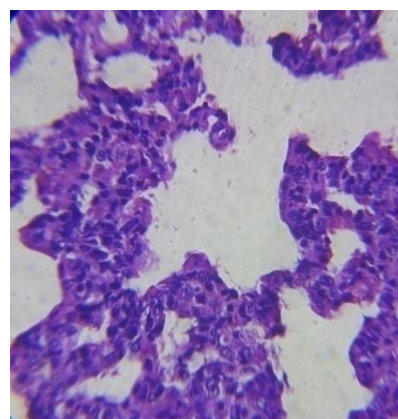
**PLATE: B CONTROL (FM)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A-** Lung parenchyma appears normal with regular arrangement of alveoli and alveolar sac.

**PLATE: B-** Perivascular region appears normal, alveolar septa and wall appeared widen and normal.

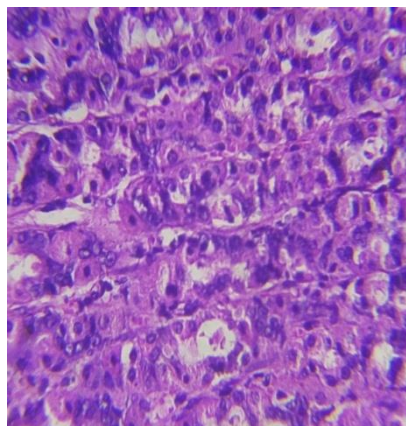
**PLATE: C-** Bronchial opening appears regular with no signs of infiltration.

**PLATE: D-** Appearance of alveolar network was normal.

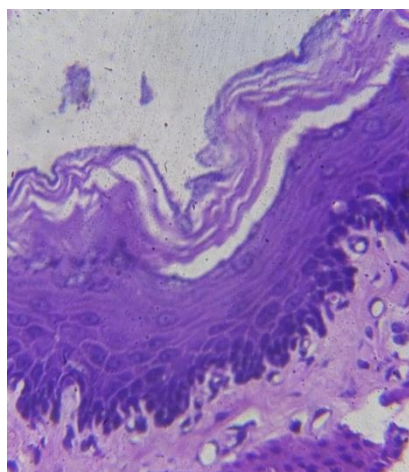
## Histopathology of Stomach

### High Power Magnification 40X

**PLATE: A CONTROL (M)**



**PLATE: A CONTROL (M)**



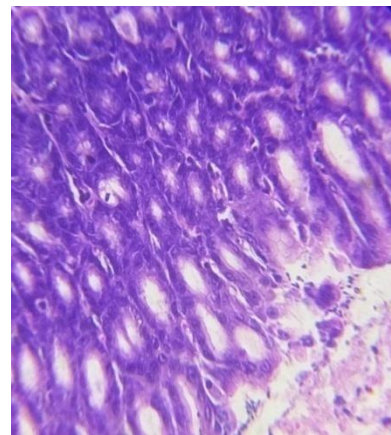
**PLATE: A-** The continuity of mucosa was normal with no evidence of ulceration.

**PLATE: B-** Appearance of Sub-mucosa and gastric glands appear normal.

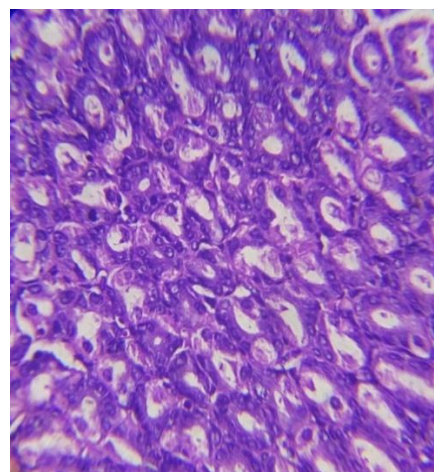
**PLATE: C-** Mucosal wall appears normal with regular arrangement of connective Tissue.

**PLATE: D-** Gastric glands including secretory sheath appears normal.

**PLATE: B CONTROL (FM)**



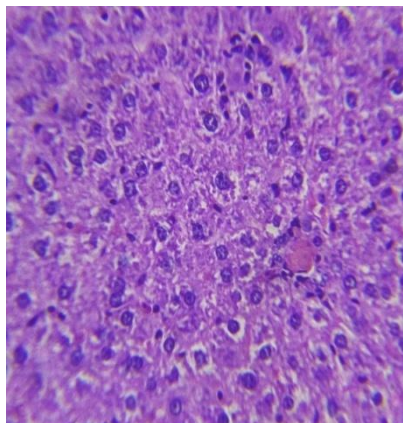
**PLATE: B CONTROL (FM)**



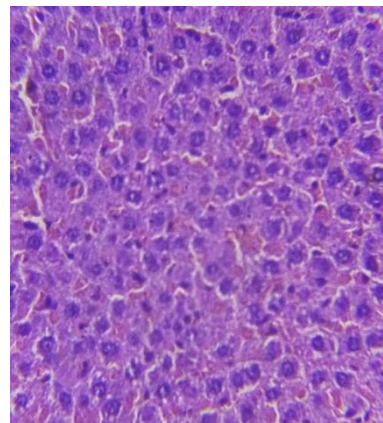
## Histopathology of Liver

### High Power Magnification 40X

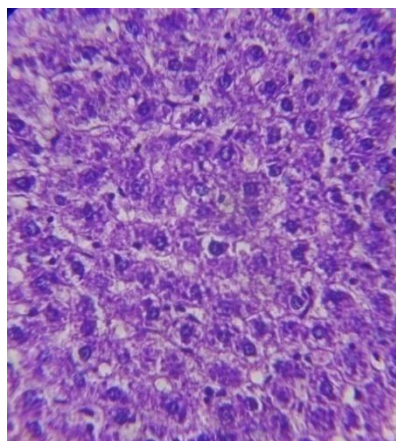
**PLATE: A CONTROL (M)**



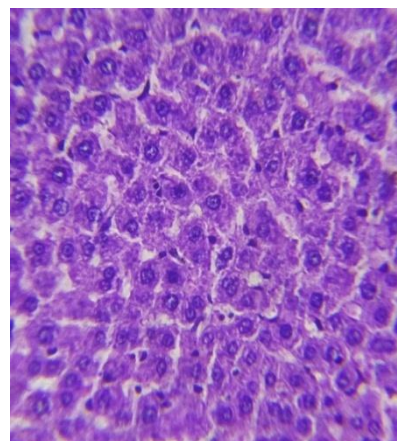
**PLATE: B CONTROL (FM)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A** - Section of liver showing normal hexagonal hepatic lobules with normal, regular radiated hepatic cords.

**PLATE: B** - Hepatocytes appear variably pale with mild congestion on central vein.

**PLATE: C** - Centrilobular zone appears normal with stable network of hepatocytes.

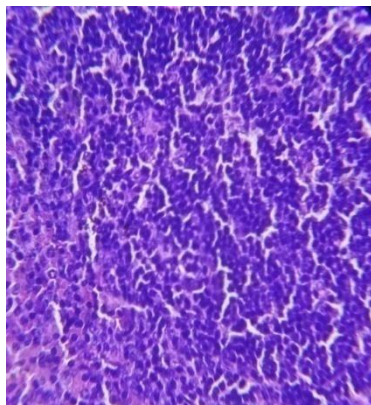
**PLATE: D** - Appearance of terminal hepatic venules (central veins) to the portal tracts was normal.



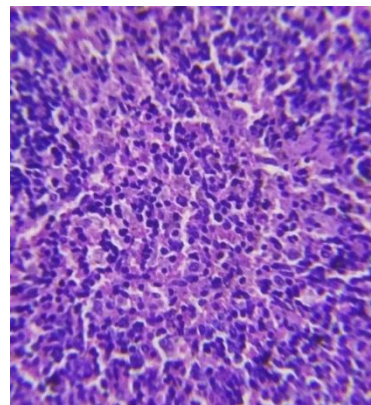
## Histopathology of Spleen

### High Power Magnification 40X

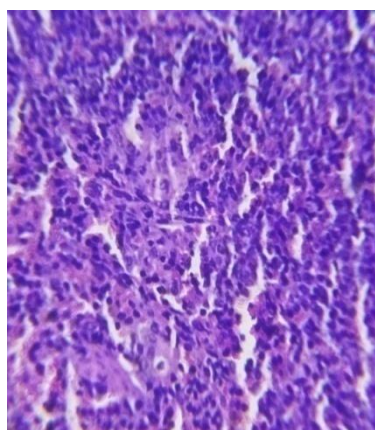
**PLATE: A CONTROL (M)**



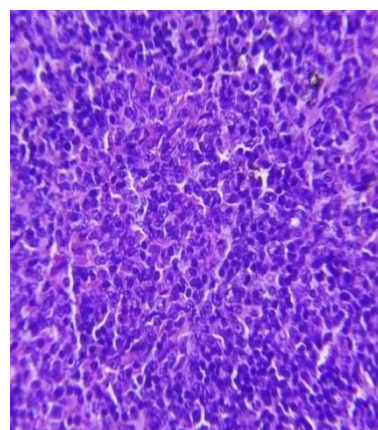
**PLATE: B CONTROL (FM)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A** – Marginal sinus (MS) of the spleen and its sinus lining cells appears normal.

**PLATE: B** – Erythropoietic cells (EP) are scattered throughout the red pulp. No abnormalities found in lymph node.

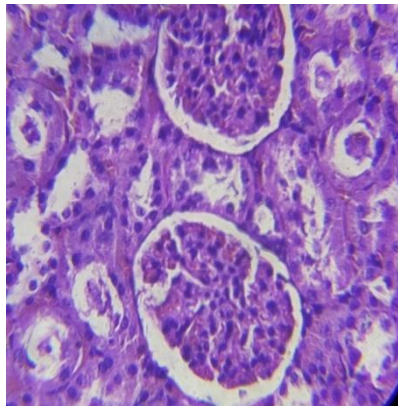
**PLATE: C** – Presence of marginal at the interface of the red pulp with the PALS and follicles was observed.

**PLATE: D** - Marginal sinus of the spleen and its sinus lining cells appears normal.

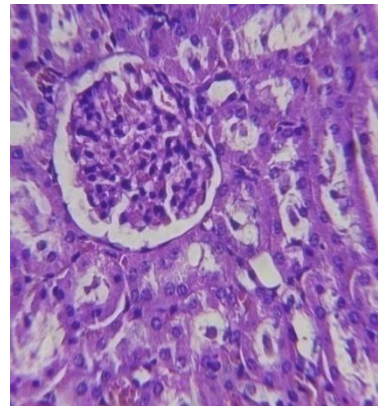
## **Histopathology of Kidney**

### **High Power Magnification 40X**

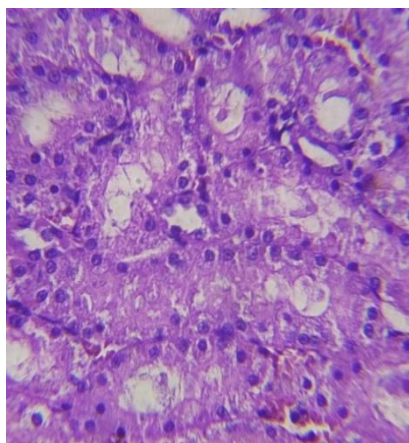
**PLATE: A CONTROL (M)**



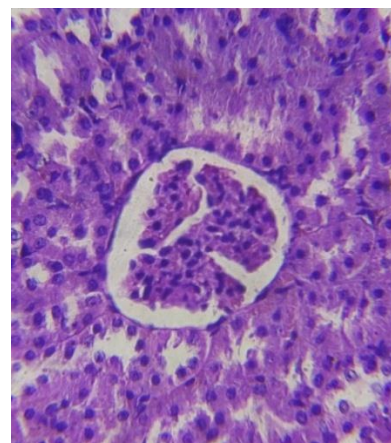
**PLATE: B CONTROL (FM)**



**PLATE: C HIGH DOSE (M)**



**PLATE: D HIGH DOSE (FM)**



**PLATE: A** – Section showing normal, intact renal tubules as well as renal glomeruli.

**PLATE: B** – Arrangement of glomerular loop was normal with regular interstitium.

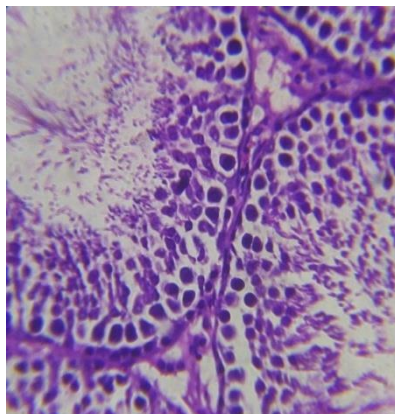
**PLATE: C** – Some renal tubules are hypertrophic, others are dilated.

**PLATE: D** - Appearance of proximal and distal convoluted tubules was normal with no evidence of atrophy.

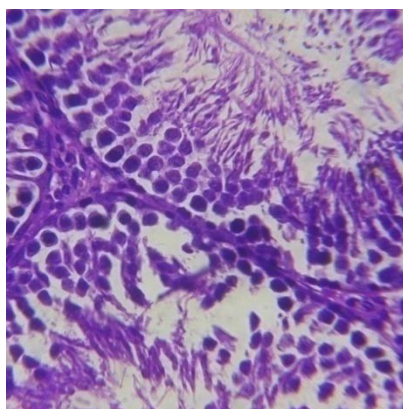
## **Histopathology of Testes**

### **High Power Magnification 40X**

#### **PLATE: A CONTROL (M)**



#### **PLATE: B HIGH DOSE (M)**



**PLATE: A** – Section of testis of showing normal interstitial connective tissue with proliferating highly divided germ cells with elongated sertoli cells.

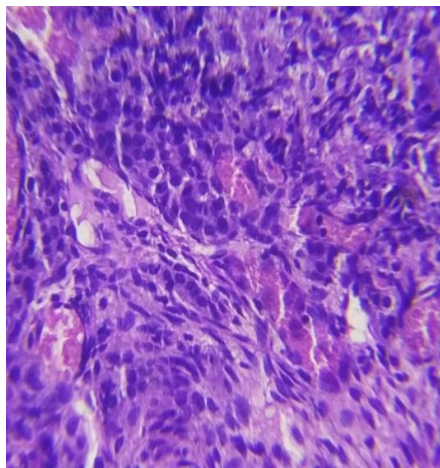
**PLATE: B** – Testicular tissue shows well differentiated germ cells with respect of spermatogonia include spermatid and sperm were observed.



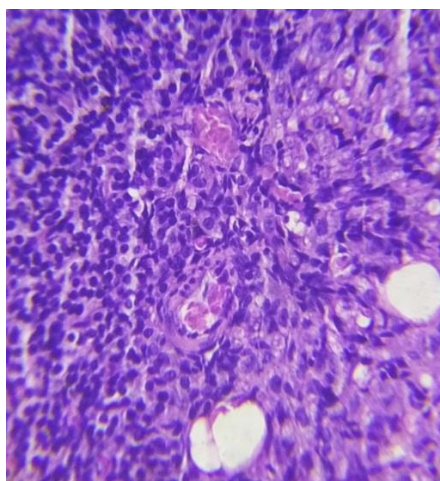
## **Histopathology of Ovary**

**High Power Magnification 40X**

**PLATE: A CONTROL (FM)**



**PLATE: B HIGH DOSE (FM)**



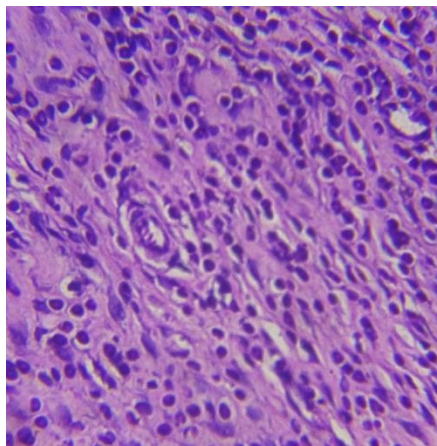
**PLATE: A** – Sequential arrangement of granulosa cells around oocyte was normal and regular.

**PLATE: B** – Appearance of antral follicle, primary oocyte and secondary follicles are normal.

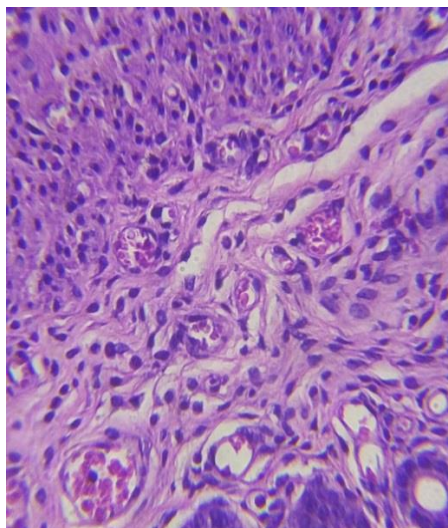
## **Histopathology of Uterus**

**High Power Magnification 40X**

**PLATE: A CONTROL (FM)**



**PLATE: B HIGH DOSE (FM)**



**PLATE: A** – Appearance of endometrium, myometrium and uterine glands was normal.

**PLATE: B** – Endometrial gland, epithelium and blood vessels appears normal.



# *Discussion*

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## DISCUSSION

After the preparation of the test drug Mandura Chenthooram it undergone Physico-chemical, Biochemical, AAS, ICP-OES, XRD, SEM, Analysis and Toxicity study and their results are discussed as follows.

The Physico - chemical analysis of MC (Table: 2) concludes the following results

The loss on drying test is designed to measure the amount of water and volatile matters in a sample when the sample is dried under specified conditions. The percentage of loss on drying of MC was less than 1%.

The Ash limit Tests are designed to measure the amount of the residual. A high ash value is indicative of contamination, substitution, adulteration or carelessness in preparing the drug. The total ash values of MC were 99.67%. Acid-insoluble ash value of MC is 94.99%. Extraction value determines the amount of active constituents in a given amount of the formulation when extracted with a solvent media such as water and alcohol. pH of the drug was 8.02, denotes it is alkaline.

Qualitative Analysis of Mandura Chenthooram (Table-3) indicates the presence of Silicate, Sulphate, Carbonate, Iron, Calcium, Alkaloid, Starch and presence of Anti pyrine, Aliphatic amino acid, Meconic acid.

The Atomic Absorption Spectroscopy result (Table-4) shows that the heavy metal iron present in Mandura Chenthooram were found, at the same time the Iron content of test drug is 22.60%.

The Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) results showed that the Heavy metals like Aluminium, Arsenic, Cadmium, Copper, Mercury, Nickel and Lead were found below detection level. It also shows the presence of physiologically important minerals like Calcium, Copper, Sodium, Magnesium, Potassium, Sulphur and Phosphorus. (Table-5)

EDAX analysis shows the elements present in the sample as shown in Figure-1. The table (Table-6) represents the weight and atomic percentage of sample. The presence of iron is 26 Wt% and Oxygen is of 41.5 % during sample preparation sintering takes place many time in presence of organic compounds of the iron gets more oxidized and the level of oxygen is increased. The presence of Si and Ca is

small contributed by the presence of sand during sample collection and the Na and K are from the White Goat milk and Urine. Since the sample is subjected to the calcination process, it became oxidized.

The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape as shown in Figure-2. The particles are aggregate and individual particles are seen on the top of the clusters. Since the particles are collected from the raw iron oxide (Rust) the particle size is large.

In Acute Toxicity Study, carried out as per OECD guidelines 423, there were no treatment related death or signs of toxicity developed in wistar albino rat at dosage levels of 300 and 2000 mg/kg b.wt throughout the study period. Further, no gross pathological changes have been seen in the internal organs of both control and treated groups. Thus, the LD50 value was found to be greater than 2000mg/kg body weight.

28 Days Repeated Oral Toxicity Study was conducted as per the OECD guidelines - 407 in 4 doses. Control group was administered 1ml of honey mixed with 1ml of distilled water. The low dose was calculated from the approximate therapeutic dose (130 mg) and body surface area of rat (0.018). Calculation of low dose –  $130 \times 0.018 = 2.34$  mg/200 gm of animal. Mid dose was calculated as  $(2.34 \times 5 = 11.7\text{mg})$  and high dose was calculated as  $(2.34 \times 10 = 23.4\text{mg})$ . Animals were observed throughout the period. There was no significant change in food intake (Table-8), water intake (Table-9), and body weight (Table-10, 11). After 28 days animals were sacrificed and blood samples were collected, investigated. The results revealed that there were no significant changes in the haematological parameters (Table-12), biochemical parameters (Table 13,14,15), The histopathological study on the organs such as brain, heart, lungs, stomach, liver, spleen, kidney, testes, ovary and uterus was normal in control, and high dose groups.

# *Summary*

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## SUMMARY

The branch of toxicology (Nanju Murivu Maruthuvam) was developed in Siddhar's period itself. Being a toxicology student the author is interested to take the drug Mandura Chenthooram to evaluate its safety profile. The name, Mandura Chenthooram comes from its ingredients manduram useful to treat various blood disorders.

Mandura Chenthooram is a Siddha formulation prepared from purified Manduram (Ferroso ferric oxide), Pasuneer (Cow urine), Vetrilai (Piper betel), Vellattupaal (Goat milk), Vellattu neer (Goat urine), Notchi (Vitex negundo), and Katrazhai (Aloe vera).

The test drug was chosen from the Siddha literature Kannusamy Parambarai Vaithiyam. The raw drugs were procured from Ramasamy Chetti shop and authenticated at Department of Gunapadam, National Institute of Siddha, Chennai-47. The Herbal drugs were identified and authenticated by Assistant Professor, Department of Medicinal Botany, National Institute of Siddha, Chennai-47. The ingredients were purified and the medicine was prepared as mentioned in the Siddha literature.

Mandura Chenthooram was analyzed qualitatively with physico chemical, biochemical analysis, and spectroscopically with AAS, ICP-OES, XRD, SEM analysis. Acute and repeated dose 28 days oral toxicity studies were conducted as per the OECD guidelines

Initially the test drug was subjected to physico chemical analysis. It reveals the increased bioavailability and purity of the drug. Then the samples were analysed for Biochemical constituents. It reveals the presence of constituents like Silicate, Sulphate, Carbonate, Iron, Calcium, Alkaloid, Starch, Anti pyrine, Aliphatic amino acid and Meconic acid.

The Atomic Absorption Spectroscopy result shows the presence of heavy metal iron in Mandura Chenthooram and the Iron content of test drug is 22.60%.

The Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) shows that Aluminium, Arsenic, Cadmium, Copper, Mercury, Nickel and Lead were

found below detection level. It also shows the presence of physiologically important minerals like Calcium, Copper, Sodium, Magnesium, Potassium, Sulphur and Phosphorus.

EDAX analysis shows the presence of elements in the sample Iron, Oxygen, Sodium, Aluminium, Silicate, Potassium, and Calcium.

The SEM imaging of the Medicine prepared from iron oxide sample shows that the particles are in micro size and irregular in shape. The particles are aggregate and individual particles are seen on the top of the clusters since the size of the particles collected from the raw iron oxide (Rust) is large.

In Acute Toxicity Study, carried out as per OECD guidelines 423, there were no treatment related death or signs of toxicity developed in wistar albino rat at dosage levels of 300 and 2000 mg/kg b.wt throughout the study period. Further, no gross pathological changes have been seen in the internal organs of both control and treated groups. Thus, the LD50 value was found to be greater than 2000mg/kg body weight.

Repeated Oral 28 Days Toxicity Study was conducted for about 28 days as per the OECD guideline-407 in 4 doses. Control group were given 1ml of honey with 1 ml distilled water. Low dose, mid dose and high dose were 2.34mg, 11.7mg and 23.4mg respectively. There was no significant change in body weight, water and food intake. There were no significant changes in the haematological and biochemical parameters. Histopathological study shows that, organs such as brain, heart, lungs, stomach, liver, spleen, kidney, testes, ovary and uterus was normal in control, and high dose groups.

# *Conclusion*

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## CONCLUSION

Mandura Chenthooram had been used by Siddhars for long time to treat various diseases such as Anaemia, Dropsy, Jaundice, Ascites, Cough, and Diarrhoea. Since Iron Oxide is present in Mandura Chenthooram, which is observed by the quantitative analysis, the drug can be easily absorbed in intestine. Acute toxicity study shows that the test drug can be used up to the dose of 2000mg/kg body weight as a single dose. As per Siddha literature, the test drug was used as a minimal dose medicine. No notable abnormalities were observed in test group of animals when compared with control group of animals. Hence, we conclude that the dosage of Mandura Chenthooram, 130mg twice a day narrated in Kannusamy Parambarai Vaithiyam is a safer therapeutic dose for uses of human. The author hopes that this study will be a footprint to future research of chronic toxicity study, Carcinogenicity, Teratogenicity regarding Mandura Chenthooram.



# *Bibiliography*

## **BIBILIOGRAPHY:**

1. Vaithiya Vithvaan C. Kannusamypillai, Kannusamy Parambarai vaithiyam, Page 318-319.
2. Dr. Ka. Su.Uththamarayan, Siddha Maruthuvanga Chuukkam, 2<sup>nd</sup> ReEdition-2006, Page No-3, Department Of Indian Medicine and Homoeopathy, Chennai-106.
3. Dr. M. Shanmugavelu, H.B.I.M., Nooinaadal Nooimudhalnaadalthirattu PART-1, 3<sup>rd</sup> Edition-2003, Page No-22, Dept.of Indian Medicine And Homeopathy, Chennai-106.
4. Dr. R. Thiyagarajan, L.I.M., Gunapadam Thathu- Jeeva Vaguppu Third Part, 9<sup>th</sup> Edition, Page No 195-202, 94, 148, 190, 283, 311. Dept.of Indian Medicine & Homoeopathy, Chennai-106.
5. Vaithiya Vidvanmani C. Kannusamy Pillai, Chikitcha Rathna@ Vaithiya Nool, 1<sup>st</sup> edition 1931, Page no 241, Rathinanayakkar And Sons , 26, Venkatram Street, Chennai-600079. Page no 242, 243, 145, 164, 184, 185.
6. Ka. Na. Kuppusamy Mudhaliar, H.P.I.M., Siddha Maruthuvam (Pothu), Reprint - 2012, Page no -360, Dept.of Indian Medicine & Homoeopathy, Chennai-106.
7. Vaidhya Vidhvaanmani C. Kannusaamy Pillai, Materia Medica Mineral and Animal kingdom, 4<sup>th</sup> Edition-2006, Page No-64, Rathinanayakkar And Sons , 26, Venkatram Street, Chennai-600079
8. Dr. R. Thiyagarajan, L.I.M., Gunapadam Thathu- Jeeva Vaguppu Third Part, 9<sup>th</sup> Edition, Page No 651-654. Dept.of Indian Medicine & Homoeopathy, Chennai-106.
9. Murugesamudhaliyar KS, Gunapadam – Part-1 (Mooligai vaguppu). Dept of Indian Medicine and Homoeopathy; 7<sup>th</sup> Edition .2006. Page no 847,851,270-271.
10. Abdulla sahib B M, Anuboga vaidya navaneetham Part-4. Thamarai noolagam, 2nd Edition, 1995; 113.
11. Vengattarajan S, Sarabenthira vaithiya muraigal (Visharoga sigitchai). Saraswathy mahal noolagam, 2005 Edition; 10-11.

12. Mohammad Abdulla Sayabu, Siddha Anuboga Vaithiya Navaneetha Thirattu, First Edition-2010, Page no-1545-1546.
13. Vaithiya Vidhvanmani C. Kannusamy Pillai, Chikitcharathna Deepam Part II Vaithiyachinthamani, 14<sup>th</sup> Edition, Page no-158, 226,229. Thirumagal Vilasa Press, Chennai-79.
14. Theraiyar Kudineer, IInd Edition – 1996, Page No-5, Ayurveda Siddhamaiya Aaraichi Kazhakam, New Delhi-110058.
15. Theraiyar Thailavarukkachurukkam,2007, Page No-53,Thamarai Press,7, N.G.O. Colony, Vadapalani, Chennai-26.
16. Anuboga Vaithiya Biramma Ragasiyam, Page No-247, Senbaga Press, Chnnai-600017.
17. Agathiyar 2000(Part-3), Page No-460, Maharaja Sarabosiyin Saraswathy Mahal Noolagam, Thanjavur-613009.
18. Dr. R. Thiagarajan, L.I.M., Gunapadam Thathu- Jeeva Vaguppu Third Part, 9<sup>th</sup> Edition, Page No 686,693,708. Dept. of Indian Medicine & Homoeopathy, Chennai-106.
19. Thiru. Mullai Muthaiya, Pathartha Gunachinthamani (Unani murai), IInd Edition-2009, Page no-47 & 48, Surya Printers and Binders, Chennai-14.
20. Dr. R. Thiagarajan, L.I.M., Gunapadam Thathu- Jeeva Vaguppu Third Part, 9<sup>th</sup> Edition, Page No 653-655. Dept. of Indian Medicine & Homoeopathy, Chennai-106.
21. Dr. Ananivari R. Anandan, Ph.D., Dr. M. Thulasimani, M.D. (Pharmaco), Siddha Materia Medica (Mineral and Animal Kingdom)-2008, Page no-156, Dept. of Indian Medicine & Homoeopathy, Chennai-106.
22. The Indian Materia Medica, Vol-2, Page no-62-63
23. T.V. Sambasivam Pillai, Dictionary of Medicine, Chemistry, Botany and allied Sciences (Based on Indian Medicine Science), Vol-V, 1994, Page no-673.
24. Mr. Virendra Kumar Jain, Jain's Cow Urine Therapy, [www.cowurine.com](http://www.cowurine.com)

25. Review Article Benefits Of Cow Urine – A Review , Sahu Rekha, Lalchand, Gupta Rakshapal and Rout OmPrakash, International Journal of Recent Advances in Multidisciplinary Research, Vol 04, issue 09, pp.2833-2835,September,2017 <https://www.researchgate.net/publication/320163094>.
26. Chemotherapeutic potential of cow urine: A review, GurpreetKaur Randhawa and Rajiv Sharma, India.Journal of Intercultural Ethnopharmacolgy,2015 Apr-Jun;4(2): 180-186.
27. Evaluation of antidiabetic, antioxidant effect and safety profile of gomutra ark in Wistar albino rats, Devender O. Sachdev, Devesh D. Gosavi, and Kartik J. Salwe, Ancient science of life. 2012 Jan-Mar; 31(3): 84-89.
28. Clinical Evaluation of Cow-Urine Extract special reference to Arsha (Hemorrhoids), Dr.Omaprakash W.Talokar, Dr.Archana R. Belge, Dr.Raman S. Belge, India.International Journal of Pharmaceutical Science Invention,Volume 2 Issue 3 || March 2013 || PP.05-08.
29. Clinical Trial Of Gomutra (Cow's Urine) In Obesity Management, Naveen Kumar Saini, Assistant Professor, Department of kayachikitsa,S.B.M.N. Ayurvedcollege,AsthalBohar,Rohtak, India. International Journal of Ayurveda and Pharma research, 2016; 4(10): 54-57
30. Betel- Wikipedia, <http://en.m.wikipedia.org>.
31. New chemical constituents from the Piper betle Linn. (Piperaceae), AkhtarAtiya, BarijNayanSinha& Uma RanjanLal, Pages 1080-1087 | Published online: 05 Oct 2017, <https://www.tandfonline.com>.
32. Biotechnological intervention in betelvine (Piper betle L.): A review on recent advances and future prospects, SuryasnataDas, ReenaParida, I.SriramSandeep, SanghamitraNayak, SujataMohanty, Asian Pacific Journal of Tropical Medicine, Volume 9, Issue 10, October 2016, Pages 938-946.
33. A Review: Nutraceuticals Properties of Piper betel (Paan), Ekta Singh Chauhan, Jaya Aishwarya, Akriti Singh and AnamikaTiwari, American Journal of Phytomedicine and Clinical Therapeutics AJPCT 4/02/2016 028-041.

34. Pharmacognostic Study on the Leaf of Piper betle L, Swe Mar Tin, Universities Research Journal 2011, Vol. 4, No. 1 Page 1-19.
35. Antioxidant and non toxic properties of Piper betle leaf extract: in vitro and in vivo studies, Dharamainder Choudhary Raosaheb K. Kale, Phytotherapy Research volume 16, Issue 5, Pages 461-466.
36. Vitex negundo – Wikipedia, <http://en.m.wikipedia.org>.
37. Evaluation of Phytochemical and Antimicrobial study of Extracts of Vitexnegundo Linn Int. GautamKeerti and Kumar Padma J. Drug International Journal of Drug Development and Research Dev. & Res., October-December 2012, 4(4): 192-199.
38. A Review Of Ethnomedicinal Plant-Vitexnegundo Linn, FauziyaBasri, H.P. Sharma, SazyaFirdaus, Paras Jain and AlokRanjan, Laboratory of Plant Physiology and Biotechnology University Department of Botany, Ranchi University, Ranchi-834008. International Journal of Advanced Research (2014), Volume 2, Issue 3, 882-894.
39. Anti-Amnesic Activity of VitexNegundo in Scopolamine Induced Amnesia in Rats, Abhinav Kanwall,, Jogender Mehla, MadhusudanaKunchal, Vegi Ganga ModiNaidul, Yogendra Kumar Gupta, Ramakrishna Sistla, Pharmacology & Pharmacy, 2010, 1, 1-8.
41. Recent update on the medicinal properties and use of Aloe vera in the treatment of various ailments, Gajendra Mahor<sup>1</sup> and Sharique A Ali, Rajeev Gandhi National Fellow UGC New Delhi. Department of Zoology and Biotechnology, Saifi a Science College, Bhopal- 462001, India. Biosci.Biotech. Res. Comm. 9(2): 273-288 (2016).
42. Aloe vera their chemicals composition and applications: A review, SharifMoghaddasi M, Sandeep Kumar Verma, International Journal of Biological & Medical Research, Int J Biol Med Res. 2011; 2(1): 466-471.
43. OECD. Guidelines for the Testing of Chemicals / Section 4: Health Effects Test No. 423: Acute Oral toxicity - Acute Toxic Class Method. Organization for Economic Cooperation and Development, Paris, France; 2002.

44. OECD. Repeated dose oral toxicity test method. In: OECD Guidelines for testing of chemicals, No. 407. Organization for Economic Cooperation and Development, Paris, France; 2008.

# *Annexure*

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NATIONAL INSTITUTE OF SIDDHA

MINISTRY OF AYUSH

GOVERNMENT OF INDIA

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
F.No:NIS/Gunapadam/Au/2017/5

03.04.17

AUTHENTICATION CERTIFICATE

Certified that the sample submitted for identification by Dr. K. Jeevaraj, II year PG scholar, Dept. of Nanju noolum Maruthuva neethi noolum, National Institute of Siddha, Chennai - 47, is identified as **Manduram (Oxide of Iron)** on the basis of macroscopic character.

This certificate is issued for the purpose of preparing his dissertation medicine in Gunapadam laboratory, NIS.

  
Dr. S. Visweswaran, M.D (s)  
**Head of Department**  
Department of Gunapadam  
National Institute of Siddha  
Tambaram  
Chennai-47.





NATIONAL INSTITUTE OF SIDDHA, CHENNAI – 600047

BOTANICAL CERTIFICATE

Certified that the following plant drugs used in the formulation *Mandura chenthooram* taken up for Post Graduation Dissertation studies by Dr.K.Jeevaraj M.D.(S), II year, Department of Nanju Noolum Maruthuva Neethi Noolum, 2017, is identified and authenticated through Visual inspection, Experience, Education & Training, Organoleptic characters, Morphology, Micromorphology and Taxonomical methods as

*Piper betle* Linn. (Piperaceae), Leaf

*Vitex negundo* Linn. (Verbenaceae), Leaf

*Aloe vera* (Linn.) Burm.f. (Liliaceae), Leaf



Certificate No: NISMB2822017

Date: 06-03-2017

  
Authorized Signatory

**Dr. D. ARAVIND, M.D.(s), M.Sc.,**  
Assistant Professor  
Department of Medicinal Botany  
National Institute of Siddha  
Chennai - 600 047, INDIA

## CERTIFICATE

This is certify that the project title... Pre-clinical evaluation of  
'Mandura chenthooram' - L9 Rats (20 M + 20 F)  
has been approved by the IAEC. Approval No: NIS/IAEC-II/09/2016

Prof. Dr. V. Banumathi  
Name of Chairman/~~Member Secretary~~ IAEC:

Prof. Dr. K. Nachimuthu  
Name of CPCSEA nominee:

V. Banumathi  
Signature with date

[Signature]  
29/9/2016

Chairman/~~Member Secretary~~ of IAEC:

CPCSEA nominee:

(Kindly make sure that minutes of the meeting duly signed by all the participants are maintained by Office)



# The Tamil Nadu Dr. M.G.R. Medical University

69, Anna Salai, Guindy, Chennai - 600 032.

This Certificate is awarded to *Dr/Mr/Mrs.....K.: J.E.E.VARAJ.....*

For participating as *Resource Person* / Delegate in the Twenty second Workshop on

## **"RESEARCH METHODOLOGY & BIOSTATISTICS"**

For AYUSH Post Graduates & Researchers

Organized by the Department of Siddha

The Tamil Nadu Dr. M.G.R. Medical University From 06<sup>th</sup> to 10<sup>th</sup> June 2016.

  
**Dr. N. KABILAN**, M.D.(S)  
PROF & HEAD  
DEPT. OF SIDDHA

  
Prof. **Dr. S. PUSHKALA**, M.D.,  
REGISTRAR (FAC)

  
Prof. **Dr. S. GEETHALAKSHMI**, M.D., Ph.D.,  
VICE CHANCELLOR





## NATIONAL INSTITUTE OF SIDDHA

(An Autonomous body under Ministry of AYUSH, Govt. of India)  
Tambaram Sanatorium, Chennai- 600 047

Workshop on

**"BASIC RESEARCH TECHNIQUES AND PRACTICES INVOLVED IN LABORATORY ANIMAL CARE"**

06 -10 February 2017

**CERTIFICATE**

This is to certify that Dr..... **K. Jeevaraj**..... has participated as

Delegate/Resource Person in the workshop on "Basic Research Techniques and Practices involved in Laboratory Animal Care" held on 06-10 February, 2017 at National Institute of Siddha, Chennai-47, Tamilnadu.

**Dr. V. Suba**  
Organizing Secretary

**Dr. P. Muthusamy**  
Veterinary Consultant

**Prof. Dr. V. Banumathi**  
Director / Chairperson